

March 10, 2015

Mr. James Johnson On-Scene Coordinator U.S. Environmental Protection Agency, Region 7 11201 Renner Boulevard Lenexa, Kansas 66219

Subject: Data Deliverable Package 08

West Lake Landfill Site, Bridgeton, Missouri

CERCLIS ID: MOD079900932

EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0058

Task Monitor: James Johnson, On-Scene Coordinator

Dear Mr. Johnson:

Tetra Tech, Inc. is submitting the following analytical laboratory reports with associated data validation reports for sampling at locations off-site of the West Lake Landfill Site in Bridgeton, Missouri.

Sample Delivery Group	Analysis Type	Sample Collection Date
J2440	Volatile Organic Compounds	12/04/2014
J9958	Alpha-emitting Ra and Isotopic U/Th	12/17/2014
J9986	Alpha-emitting Ra and Isotopic U/Th	12/23/2014
J10012	Alpha-emitting Ra and Isotopic U/Th	12/31/2014
J10012	Gamma scan and gross alpha/beta	12/31/2014
J10086	Alpha-emitting Ra and Isotopic U/Th	01/06/2015
J10086	Gamma scan and gross alpha/beta	01/06/2015
J10181	Alpha-emitting Ra and Isotopic U/Th	01/14/2015
J10273	Alpha-emitting Ra and Isotopic U/Th	01/21/2015
J10333	Gamma scan and gross alpha/beta	01/28/2015
60187128	Volatile Organic Compounds	01/28/2015
P15000232	Hydrogen Sulfide	01/19/2015
P15000342	Hydrogen Sulfide	01/28/2015
P15000481	Hydrogen Sulfide	02/04/2015

If you have any questions or comments, please contact Rob Monnig at (816) 412-1775.

Sincerely,

€ Dave Kinroth

START Project Manager

Ted Faile, PG, CHMM START Program Manager 0714

40482947 Superfund 1.0

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

0400

415 Oak Street, Kansas City, MO 64106 Tel 816.412.1741 Fax 816.410.1748 www.tetratech.com



March 6, 2015

Mr. James Johnson On-Scene Coordinator U.S. Environmental Protection Agency, Region 7 11201 Renner Boulevard Lenexa, Kansas 66219

Subject: Interim Data Summary of AreaRAE Measurements During Ongoing Baseline

Off-Site Air Monitoring

West Lake Landfill Site, Bridgeton, Missouri

CERCLIS ID: MOD079900932

EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0058

Task Monitor: James Johnson, On-Scene Coordinator

Dear Mr. Johnson:

Tetra Tech, Inc. is submitting the attached Interim Data Summary Report regarding carbon monoxide, hydrogen sulfide, and sulfur dioxide measurements by RAE Systems, Inc., AreaRAE instruments during ongoing air monitoring at locations off site of the West Lake Landfill site (WLLS) in Bridgeton, Missouri. This monitoring is occurring during a baseline period prior to start of construction of an isolation barrier at WLLS. If you have any questions or comments, please contact me at (816) 412-1775.

Sincerely,

Robert Monnig, PE

START Project Manager

Ted Faile, PG, CHMM START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Knoxville, Tennessee)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 24, 2015
Sample Delivery Group (SDG):	J2440
Sample Numbers:	WAA-01-SU-PS-20141204, WAA-02-SU-PS-20141204, WAA-03-SU-PS-20141204, WAA-04-SU-PS-20141204, WAA-04-SU-DU-20141204, WAA-05-SU-PS-20141204, and WAA-00-SU-TB-20141204
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labon the applicable methods. The review was intended to identify apparent from the summary data path hat were found, and data qualificationited to the available field and laboackage. Harry Ellis, certify that all data variables.	ratory Program National Functional Guidelines for Superfund Organic Dynamic Pattern (Petra Tech document "Review of Data Pattern (Pebruary 2002) was used along with other criteria specified of problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were deepended to the data accorded with those documents. 24 February 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J2440 included five (5) environmental air (passivated canister) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for volatile organic compounds via EPA Air Method TO-15. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by canister to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low concentrations (less than the reporting limit) of the common laboratory contaminant methylene chloride. The similar concentrations of methylene chloride in the field blank and most other field samples were qualified as laboratory artifacts and flagged "U". The one result for methylene chloride above the reporting limit was qualified as estimated, possibly biased high, and flagged "J".

IV. Laboratory Control Sample (LCS)

Most percent recoveries from the LCS analysis were within the established control limits. However, recoveries of 1,1,2-trichloro-1,2,2-trifluoroethane (131 percent, versus QC limits of 70 to 130 percent) and 1,1-dichloroethene (133 percent, versus the same limits) exceeded QC limits. The detected results for those two analytes were qualified as estimated, possibly biased high, and flagged "J".

V. Surrogates

All surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

Many detected results were less than reporting limits, which correspond to the lowest calibration standard. The laboratory correctly reported these extrapolations as estimated (flagged "J"). All results in the field duplicate pair were quite similar.

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications added. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Knoxville 5815 Middlebrook Pike Knoxville, TN 37921 Tel: (865)291-3000

TestAmerica Job ID: 140-2440-1

Client Project/Site: West Lake Landfill

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Authorized for release by: 12/17/2014 12:37:24 PM

Jamie McKinney, Senior Project Manager (865)291-3000

jamie.mckinney@testamericainc.com

·····LINKS ······

Review your project results through

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Have a Question?



Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

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Definitions/Glossary

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
*	LCS or LCSD exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
В	Compound was found in the blank and sample.

Glossary

TEF

TEQ

Toxicity Equivalent Factor (Dioxin)
Toxicity Equivalent Quotient (Dioxin)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points

Case Narrative

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Job ID: 140-2440-1

Laboratory: TestAmerica Knoxville

Narrative

Job Narrative 140-2440-1

Comments

No additional comments.

Receipt

The samples were received on 12/9/2014 10:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice.

Air - GC/MS VOA

Method(s) TO 14A, TO 15 LL, TO-14A, TO-15: EPA methods TO-14A and TO-15 specify the use of humidified "zero air" as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by TestAmerica Knoxville.

Method(s) TO-15: The following analyte(s) recovered outside control limits for the LCS associated with batch 2031: 1,1,-dichloroethene and 1,1,2-trichloro-1,2,2-trifluoroethane. This is not indicative of a systematic control problem because these were random marginal exceedances. Qualified results have been reported.

The continuing calibration verification (CCV) associated with batch 2031 exhibited % difference of > 30% for the following analyte(s) 1,1-dichloroethene, 1,1,2-trichloro-1,2,2-trifluoroethane and chloromethane, however the results were within the LCS acceptance limits. The EPA method requires that all target analytes in the continuing calibration verification standard be within 30% difference from the initial calibration. According to the laboratory standard operating procedure, the continuing calibration is acceptable if it meets the laboratory control sample acceptance criteria.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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IR

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-1

Lab Sample ID: 140-2440-2

Lab Sample ID: 140-2440-3

Client Sample ID: WAA-01-SU-PS-20141204

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.094	J *	0.20	0.031	ppb v/v	1	_	TO-15	Total/NA
Benzene	0.24		0.20	0.056	ppb v/v	1		TO-15	Total/NA
Carbon tetrachloride	0.096	J	0.20	0.038	ppb v/v	1		TO-15	Total/NA
Chloromethane	0.70		0.50	0.16	ppb v/v	1		TO-15	Total/NA
Dichlorodifluoromethane	0.46		0.20	0.068	ppb v/v	1		TO-15	Total/NA
Methylene Chloride	0.39	JB	0.50	0.13	ppb v/v	1		TO-15	Total/NA
Toluene	0.28		0.20	0.12	ppb v/v	1		TO-15	Total/NA
Trichlorofluoromethane	0.21		0.20	0.024	ppb v/v	1		TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.72	J *	1.5	0.24	ug/m3		_	TO-15	Total/NA
Benzene	0.76		0.64	0.18	ug/m3	1		TO-15	Total/NA
Carbon tetrachloride	0.60	J	1.3	0.24	ug/m3	1		TO-15	Total/NA
Chloromethane	1.4		1.0	0.33	ug/m3	1		TO-15	Total/NA
Dichlorodifluoromethane	2.3		0.99	0.34	ug/m3	1		TO-15	Total/NA
Methylene Chloride	1.4	JB	1.7	0.45	ug/m3	1		TO-15	Total/NA
Toluene	1.0		0.75	0.45	ug/m3	1		TO-15	Total/NA
Trichlorofluoromethane	1.2		1.1	0.13	ug/m3	1		TO-15	Total/NA

Client Sample ID: WAA-02-SU-PS-20141204

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.088	J *	0.20	0.031	ppb v/v	1	_	TO-15	Total/NA
Benzene	0.24		0.20	0.056	ppb v/v	1		TO-15	Total/NA
Carbon tetrachloride	0.070	J	0.20	0.038	ppb v/v	1		TO-15	Total/NA
Chloromethane	1.0		0.50	0.16	ppb v/v	1		TO-15	Total/NA
Dichlorodifluoromethane	0.51		0.20	0.068	ppb v/v	1		TO-15	Total/NA
Methylene Chloride	0.43	JB	0.50	0.13	ppb v/v	1		TO-15	Total/NA
Toluene	0.25		0.20	0.12	ppb v/v	1		TO-15	Total/NA
Trichlorofluoromethane	0.23		0.20	0.024	ppb v/v	1		TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.68	J *	1.5	0.24	ug/m3	1	_	TO-15	Total/NA
Benzene	0.76		0.64	0.18	ug/m3	1		TO-15	Total/NA
Carbon tetrachloride	0.44	J	1.3	0.24	ug/m3	1		TO-15	Total/NA
Chloromethane	2.1		1.0	0.33	ug/m3	1		TO-15	Total/NA
Dichlorodifluoromethane	2.5		0.99	0.34	ug/m3	1		TO-15	Total/NA
Methylene Chloride	1.5	JB	1.7	0.45	ug/m3	1		TO-15	Total/NA
Toluene	0.96		0.75	0.45	ug/m3	1		TO-15	Total/NA
Trichlorofluoromethane	1.3		1.1	0.40	ug/m3			TO-15	Total/NA

Client Sample ID: WAA-03-SU-PS-20141204

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.12	J *	0.20	0.031	ppb v/v	1	_	TO-15	Total/NA
1,2,4-Trimethylbenzene	0.12	J	0.20	0.063	ppb v/v	1		TO-15	Total/NA
Benzene	0.27		0.20	0.056	ppb v/v	1		TO-15	Total/NA
Carbon tetrachloride	0.11	J	0.20	0.038	ppb v/v	1		TO-15	Total/NA
Chloromethane	1.0		0.50	0.16	ppb v/v	1		TO-15	Total/NA
Dichlorodifluoromethane	0.55		0.20	0.068	ppb v/v	1		TO-15	Total/NA
Ethylbenzene	0.069	J	0.20	0.068	ppb v/v	1		TO-15	Total/NA
Methylene Chloride	0.72	В	0.50	0.13	ppb v/v	1		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Knoxville

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Client: Tetra Tech EM Inc. TestAmerica Job ID: 140-2440-1 Project/Site: West Lake Landfill

Client Sample ID: WAA-03-SU-PS-20141204 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
m-Xylene & p-Xylene	0.16	J	0.20	0.12	ppb v/v	1	_	TO-15	Total/NA
o-Xylene	0.074	J	0.20	0.061	ppb v/v	1		TO-15	Total/NA
Toluene	0.54		0.20	0.12	ppb v/v	1		TO-15	Total/NA
Trichlorofluoromethane	0.25		0.20	0.024	ppb v/v	1		TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.89	J *	1.5	0.24	ug/m3	1	_	TO-15	Total/NA
1,2,4-Trimethylbenzene	0.60	J	0.98	0.31	ug/m3	1		TO-15	Total/NA
Benzene	0.85		0.64	0.18	ug/m3	1		TO-15	Total/NA
Carbon tetrachloride	0.72	J	1.3	0.24	ug/m3	1		TO-15	Total/NA
Chloromethane	2.1		1.0	0.33	ug/m3	1		TO-15	Total/NA
Dichlorodifluoromethane	2.7		0.99	0.34	ug/m3	1		TO-15	Total/NA
Ethylbenzene	0.30	J	0.87	0.30	ug/m3	1		TO-15	Total/NA
Methylene Chloride	2.5	В	1.7	0.45	ug/m3	1		TO-15	Total/NA
m-Xylene & p-Xylene	0.69	J	0.87	0.52	ug/m3	1		TO-15	Total/NA
o-Xylene	0.32	J	0.87	0.26	ug/m3	1		TO-15	Total/NA
Toluene	2.0		0.75	0.45	ug/m3	1		TO-15	Total/NA
Trichlorofluoromethane	1.4		1.1	0.13	ug/m3	1		TO-15	Total/NA

Client Sample ID: WAA-04-SU	Lab Sample ID: 140-244								
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D I	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.083	J *	0.20	0.031	ppb v/v	1.48	_ 1	TO-15	Total/NA
1,2-Dichloroethane	0.051	J	0.20	0.047	ppb v/v	1.48	7	TO-15	Total/NA
Benzene	0.25		0.20	0.056	ppb v/v	1.48	7	TO-15	Total/NA
Carbon tetrachloride	0.087	J	0.20	0.038	ppb v/v	1.48	1	TO-15	Total/NA
Chloromethane	1.0		0.50	0.16	ppb v/v	1.48	7	TO-15	Total/NA
Dichlorodifluoromethane	0.43		0.20	0.068	ppb v/v	1.48	7	TO-15	Total/NA
Methylene Chloride	0.36	JB	0.50	0.13	ppb v/v	1.48		TO-15	Total/NA
o-Xylene	0.064	J	0.20	0.061	ppb v/v	1.48	7	TO-15	Total/NA
Toluene	0.23		0.20	0.12	ppb v/v	1.48	7	TO-15	Total/NA
Trichlorofluoromethane	0.20		0.20	0.024	ppb v/v	1.48	1	TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D I	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.63	J *	1.5	0.24	ug/m3	1.48	_ =	TO-15	Total/NA
1,2-Dichloroethane	0.21	J	0.81	0.19	ug/m3	1.48	7	TO-15	Total/NA
Benzene	0.80		0.64	0.18	ug/m3	1.48	1	TO-15	Total/NA
Carbon tetrachloride	0.54	J	1.3	0.24	ug/m3	1.48	1	TO-15	Total/NA
Chloromethane	2.1		1.0	0.33	ug/m3	1.48	7	TO-15	Total/NA
Dichlorodifluoromethane	2.1		0.99	0.34	ug/m3	1.48	7	TO-15	Total/NA
Methylene Chloride	1.2	JВ	1.7	0.45	ug/m3	1.48		TO-15	Total/NA
o-Xylene	0.28	J	0.87	0.26	ug/m3	1.48	7	TO-15	Total/NA
Toluene	0.86		0.75	0.45	ug/m3	1.48	7	TO-15	Total/NA
Trichlorofluoromethane	1.1		1.1	0.13	ug/m3	1.48		TO-15	Total/NA

Client Sample ID: WAA-05-SU-PS-20141204

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.087	J *	0.20	0.031	ppb v/v	1	_	TO-15	Total/NA
Benzene	0.27		0.20	0.056	ppb v/v	1		TO-15	Total/NA
Carbon tetrachloride	0.079	J	0.20	0.038	ppb v/v	1		TO-15	Total/NA
Chloromethane	1.1		0.50	0.16	ppb v/v	1		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

12/17/2014

Lab Sample ID: 140-2440-3

Lab Sample ID: 140-2440-5

TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-5

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill

Client Sample ID: WAA-05-SU-PS-20141204 (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Dichlorodifluoromethane	0.43		0.20	0.068	ppb v/v	1	_	TO-15	Total/NA
Methylene Chloride	0.31	JB	0.50	0.13	ppb v/v	1		TO-15	Total/NA
Toluene	0.25		0.20	0.12	ppb v/v	1		TO-15	Total/NA
Trichloroethene	0.053	J	0.20	0.036	ppb v/v	1		TO-15	Total/NA
Trichlorofluoromethane	0.22		0.20	0.024	ppb v/v	1		TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.67	J *	1.5	0.24	ug/m3		_	TO-15	Total/NA
Benzene	0.87		0.64	0.18	ug/m3	1		TO-15	Total/NA
Carbon tetrachloride	0.50	J	1.3	0.24	ug/m3	1		TO-15	Total/NA
Chloromethane	2.3		1.0	0.33	ug/m3	1		TO-15	Total/NA
Dichlorodifluoromethane	2.1		0.99	0.34	ug/m3	1		TO-15	Total/NA
Methylene Chloride	1.1	JB	1.7	0.45	ug/m3	1		TO-15	Total/NA
Toluene	0.95		0.75	0.45	ug/m3	1		TO-15	Total/NA
Trichloroethene	0.29	J	1.1	0.19	ug/m3	1		TO-15	Total/NA
Trichlorofluoromethane	1.2		1.1	0.13	ug/m3	1		TO-15	Total/NA

Client Sample ID: WAA-04-SU-DU-20141204

Client Sample ID: WAA-04-SU	-DU-20141	204				L	_al	Sample	ID: 140-2440-6
– Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.088	J *	0.20	0.031	ppb v/v	1	_	TO-15	Total/NA
Benzene	0.21		0.20	0.056	ppb v/v	1		TO-15	Total/NA
Carbon tetrachloride	0.065	J	0.20	0.038	ppb v/v	1		TO-15	Total/NA
Chloromethane	1.1		0.50	0.16	ppb v/v	1		TO-15	Total/NA
Dichlorodifluoromethane	0.52		0.20	0.068	ppb v/v	1		TO-15	Total/NA
Methylene Chloride	0.35	JB	0.50	0.13	ppb v/v	1		TO-15	Total/NA
Toluene	0.21		0.20	0.12	ppb v/v	1		TO-15	Total/NA
Trichlorofluoromethane	0.24		0.20	0.024	ppb v/v	1		TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,1,2-Trichloro-1,2,2-trifluoroethane	0.68	J *	1.5	0.24	ug/m3	1	_	TO-15	Total/NA
Benzene	0.66		0.64	0.18	ug/m3	1		TO-15	Total/NA
Carbon tetrachloride	0.41	J	1.3	0.24	ug/m3	1		TO-15	Total/NA
Chloromethane	2.3		1.0	0.33	ug/m3	1		TO-15	Total/NA
Dichlorodifluoromethane	2.6		0.99	0.34	ug/m3	1		TO-15	Total/NA
Methylene Chloride	1.2	JB	1.7	0.45	ug/m3	1		TO-15	Total/NA
Toluene	0.79		0.75	0.45	ug/m3	1		TO-15	Total/NA
Trichlorofluoromethane	1.4		1.1	0.13	ug/m3	1		TO-15	Total/NA

Client Sample ID: WAA-00-SU-TB-20141204

— Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Methylene Chloride	0.25	JB -	0.50	0.13	ppb v/v	1	TO-15	Total/NA
Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D Method	Prep Type
Methylene Chloride	0.85	J B	1.7	0.45	ua/m3		TO-15	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Knoxville

Lab Sample ID: 140-2440-7

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-01-SU-PS-20141204

Date Collected: 12/04/14 15:46 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-1

Matrix: Air

Analyte	Result	n Ambient A Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Trichloroethane	ND		0,20	0,030	ppb v/v			12/10/14 21:01	1
1,2,2-Tetrachloroethane	ND		0.20	0.061	ppb v/v			12/10/14 21:01	1
1,1,2-Trichloro-1,2,2-trifluoroetha	0.094	J	0,20	0.031	ppb v/v			12/10/14 21:01	1
ne									
,1,2-Trichloroethane	ND		0.20	0.054	ppb v/v			12/10/14 21 01	1
1-Dichloroethane	ND		0.20	0.026	ppb v/v			12/10/14 21 01	1
1,1-Dichloroethene	ND	•	0.20	0.034	ppb v/v			12/10/14 21:01	1
1,2,4-Trichlorobenzene	ND		1.0	0.098	ppb v/v			12/10/14 21 01	1
,2,4-Trimethylbenzene	ND		0.20	0.063	ppb v/v			12/10/14 21:01	1
1,2-Dichloro-1,1,2,2-tetrefluoroethane	ND		0,20	0.032	ppb v/v			12/10/14 21:01	1
,2-Dichlorobenzene	ND		0.20	0 070	ppb v/v			12/10/14 21:01	1
1,2-Dichloroethane	ND		0.20	0.047	ppb v/v			12/10/14 21:01	1
1,2-Dichloropropane	ND		0.20	0.052	ppb v/v			12/10/14 21:01	1
1,3,5-Trimethylbenzene	ND		0.20	0.065	ppb v/v			12/10/14 21:01	1
1,3-Dichlorobenzene	ND		0.20	0.065	ppb v/v			12/10/14 21:01	1
1,4-Dichlorobenzene	ND		0.20	0.064	ppb v/v			12/10/14 21:01	1
Benzene	0.24		0.20	0.056	ppb v/v			12/10/14 21:01	1
Benzyl chloride	ND		0.40	0.078	ppb v/v			12/10/14 21:01	1
Bromomethane	ND		0.20	0.032	ppb v/v			12/10/14 21 01	1
Carbon tetrachloride	0.096	J	0,20	0.038	ppb v/v			12/10/14 21 01	1
Chlorobenzene	ND		0.20		ppb v/v			12/10/14 21:01	1
Chloroethane	ND		0,20		ppb v/v			12/10/14 21:01	1
Chloroform	ND		0.20		ppb v/v			12/10/14 21:01	1
Chloromethane	0.70		0.50		ppb v/v			12/10/14 21:01	1
cis-1,2-Dichloroethene	ND		0.20		ppb v/v			12/10/14 21 01	1
cis-1,3-Dichloropropene	ND		0.20		ppb v/v			12/10/14 21 01	1
Dichlorodifluoromethane	0.46		0.20		ppb v/v			12/10/14 21 01	
Ethylbenzene	ND		0.20		ppb v/v			12/10/14 21 01	1
1,2-Dibromoethane (EDB)	ND		0.20		ppb v/v			12/10/14 21 01	1
Hexachlorobutadiene	ND.		1.0		ppb v/v			12/10/14 21:01	1
		JB U	(0.50)		ppb v/v			12/10/14 21:01	1
Methylene Chloride	0.39 ND	36 01						12/10/14 21:01	1
m-Xylene & p-Xylene			0.20		ppb v/v				
o-Xylene	ND				ppb v/v			12/10/14 21:01	1
Styrene	ND		0.20		ppb v/v			12/10/14 21:01	
Tetrachloroethene	ND		0.20		ppb v/v			12/10/14 21:01	1
Toluene	0.28		0.20		ppb v/v			12/10/14 21 01	1
trans-1,3-Dichloropropene	ND		0.20		ppb v/v			12/10/14 21 01	1
Trichloroethene	ND		0,20		ppb v/v			12/10/14 21 01	1
Trichlorofluoromethane	0.21		0.20		ppb v/v			12/10/14 21 01	1
Vinyl chloride	ND		0.20	0.071	ppb v/v			12/10/14 21:01	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1.1-Trichloroethane	ND		1.1	0.16	ug/m3	-(7 (10) 1	12/10/14 21 01	1
1,1,2,2-Tetrachloroethane	ND		1.4	0.42	ug/m3			12/10/14 21 01	1
1,1,2-Trichloro-1,2,2-trifluoroetha	0.72	35	1.5	0.24	ug/m3			12/10/14 21 01	1
ne									
1 1,2-Trichloroethane	ND		1,1		ug/m3			12/10/14 21:01	1
1,1-Dichloroethane	ND		0 81	0_11	ug/m3			12/10/14 21 01	1
1 1-Dichloroethene	' 4 12	•	0.79	0.13	cgr/m3			12/10/14 21 01	1

TestAmerica Knoxville
12/17/2014

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-01-SU-PS-20141204

Date Collected: 12/04/14 15:46 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-1

Matrix: Air

nalyte	Result 0	Qualifier	RL I	MDL	Unit	D	Prepared	Analyzed	Dil Fac
,2,4-Trich(orobenzene	ND		7.4	0.73	ид/т3			12/10/14 21 01	1
,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/10/14 21:01	1
,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/10/14 21:01	1
,2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/10/14 21:01	1
2-Dichloroethane	ND		0,81	0.19	ug/m3			12/10/14 21 01	1
,2-Dichloropropane	ND		0.92	0,24	ug/m3			12/10/14 21:01	1
3 5-Trimethylbenzene	ND		0.98	0.32	ug/m3			12/10/14 21:01	1
,3-Dichlorobenzene	ND		1,2	0.39	ug/m3			12/10/14 21:01	1
,4-Dichlorobenzene	N D		1.2	0,38	ug/m3			12/10/14 21:01	1
enzene	0.76		0.64	0.18	ug/m3			12/10/14 21:01	1
enzyl chloride	ND		2.1	0.40	ug/m3			12/10/14 21:01	1
romomethane	ND		0.78	0.12	ug/m3			12/10/14 21:01	1
arbon tetrachloride	0.60 J	J	1.3	0.24	ug/m3			12/10/14 21 01	1
hlorobenzene	ND		0,92	0.23	ug/m3			12/10/14 21 01	1
hloroethane	ND		0.53 0.	.092	ug/m3			12/10/14 21:01	1
hloroform	ND		0.98	0.19	ug/m3			12/10/14 21.01	1
hloromethane	1,4		1.0	0,33	ug/m3			12/10/14 21:01	1
is-1,2-Dichloroethene	ND		0.79	0.24	ug/m3			12/10/14 21:01	1
is-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/10/14 21:01	1
ichlorodifluoromethane	2.3		0,99	0.34	ug/m3			12/10/14 21:01	1
thylbenzene	ND		0.87	0.30	ug/m3			12/10/14 21 01	1
,2-Dibromoethane (EDB)	ND		1.5	0.34	ug/m3			12/10/14 21 01	1
lexachlorobutadiene	ND		11	0.83	ug/m3			12/10/14 21 01	1
lethylene Chloride	14	IB, U	1.7	0.45	ug/ m 3			12/10/14 21:01	1
n-Xylene & p-Xylene	ND		0.87	0.52	ug/m3			12/10/14 21:01	1
-Xylene	ND		0.87	0.26	ug/m3			12/10/14 21:01	1
ityrene	ND		0.85		ug/m3			12/10/14 21:01	1
etrachloroethene	ND		1.4	0.27	ug/m3			12/10/14 21:01	1
oluene	1.0		0.75	0.45	ug/m3			12/10/14 21 01	1
ans-1,3-Dichloropropene	ND		0.91	0,22	ug/m3			12/10/14 21:01	1
richloroethene	ND		1,1	0.19	ug/m3			12/10/14 21 01	1
richlorofiuoromethane	1.2				ug/m3			12/10/14 21 01	1
THE THE TENED TO T					-				

Client Sample ID: WAA-02-SU-PS-20141204

100

Date Collected: 12/04/14 14:27 Date Received: 12/09/14 10:15

4-Bromofluorobenzene (Sun)

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-2

12/10/14 21 01

Matrix: Air

Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dit Fac
ND	0.20	0.030	ppb v/v			12/10/14 22 26	1
ND	0.20	0.081	ppb v/v			12/10/14 22:26	1
JE 880.0	0 20	0,031	ppb v/v			12/10/14 22 26	1
4.00							
	ND ND	ND 0.20 ND 0.20 0.088 JF 0.20	ND 0.20 0.030 ND 0.20 0.081 0.088 JF 0.20 0.031	ND 0.20 0.030 ppb v/v ND 0.20 0.081 ppb v/v 0.088 JF 0.20 0.031 ppb v/v	ND 0.20 0.030 ppb v/v ND 0.20 0.081 ppb v/v 0.088 JF 0.20 0.031 ppb v/v	ND 0.20 0.030 ppb v/v ND 0.20 0.081 ppb v/v 0.088 JF 0.20 0.031 ppb v/v	ND 0.20 0.030 ppb v/v 12/10/14 22 26 ND 0.20 0.081 ppb v/v 12/10/14 22 26 0.088 JF 0.20 0.031 ppb v/v 12/10/14 22 26

60 - 140

HUE 24 Pet 15

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-2

Matrix: Air

Client Sample ID: WAA-02-SU-PS-20141204

Date Collected: 12/04/14 14:27 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

nalyte	ompounds ii Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Dichloroethane	ND		0 20	0.026	ppb v/v	-		12/10/14 22:26	1
1-Dichloroethene	ND	*	0.20	0.034	ppb v/v			12/10/14 22:26	
2,4-Trichtorobenzene	ND		1.0	0,098	ppb v/v			12/10/14 22 26	
,2,4-Trimethylbenzene	ND		0.20	0.063	ppb v/v			12/10/14 22:26	1
,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.20	0.032	ppb v/v			12/10/14 22:26	1
,2-Dichlorobenzene	ND		0.20	0,070	ppb v/v			12/10/14 22 26	1
.2-Dichloroethane	ND		0,20	0 047	ppb v/v			12/10/14 22:26	1
2-Dichloropropane	ND		0.20	0,052	ppb v/v			12/10/14 22 26	1
,3,5-Trimethylbenzene	ND		0.20	0.065	ppb v/v			12/10/14 22 26	
,3-Dichlorobenzene	ND		0.20	0,065	ppb v/v			12/10/14 22 26	
,4-Dichlorobenzene	ND		0.20	0.064	ppb v/v			12/10/14 22 26	
Benzene	0.24		0.20	0.056	ppb v/v			12/10/14 22 26	
Benzyl chloride	ND		0.40	0.078	ppb v/v			12/10/14 22 26	
Bromomethane	ND		0.20	0.032	ppb v/v			12/10/14 22:26	
Carbon tetrachloride	0,070	J	0,20	0.038	ppb v/v			12/10/14 22:26	
Chlorobenzene	ND		0.20	0.049	ppb v/v			12/10/14 22:26	
Chloroethane	ND		0.20	0,035	ppb v/v			12/10/14 22:26	
Chloroform	ND		0,20	0.038	ppb v/v			12/10/14 22:26	
Chloromethane	1.0		0.50	0,16	ppb v/v			12/10/14 22:26	
is-1,2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/10/14 22:26	
is-1,3-Dichloropropene	ND		0.20	0,074	ppb v/v			12/10/14 22:26	
Dichlorodifluoromethane	0.51		0.20	0.068	ppb v/v			12/10/14 22:26	
Ethylbenzene	ND		0.20	0 068	ppb v/v			12/10/14 22:26	
,2-Dibromoethane (EDB)	ND		0.20	0.044	ppb v/v			12/10/14 22:26	
lexachlorobuladiene	פא		า.บั	0.078	ppb v/v			12/10/14 22:26	
Methylene Chloride	0.13	JB W	0.59	0.13	ppb v/v			12/10/14 22 26	
n-Xylene & p-Xylene	ND		0.20	0.12	ppb v/v			12/10/14 22:26	
-Xylene	ND		0.20	0.061	ppb v/v			12/10/14 22:26	
Styrene	ND		0.20	0.058	ppb v/v			12/10/14 22:26	1.
Fetrachloroethene	ND		0.20		ppb v/v			12/10/14 22 26	
Toluene	0.25		0.20	0.12	ppb v/v			12/10/14 22 26	
rans-1,3-Dichloropropene	ND		0.20	0.048	ppb v/v			12/10/14 22 26	
Trichloroethene	ND		0,20		ppb v/v			12/10/14 22:26	
Trichtorofluoromethane	0.23		0.20		ppb v/v			12/10/14 22 26	
Vinyl chloride	МD		0.20	0.071	ppb v/v			12/10/14 22 26	
Analyle	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
1,1,1-Trichloroethane	ND	details.	1.1	and distributed the	ug/m3	_ = -		12/10/14 22 26	
1,1,2,2-Tetrachloroethane	NO		1.4		vg/m3			12/10/14 22 26	
1,1,2-Trichloro-1.2,2-trifluoroetha	880	3	1.5		ug/m3			12/10/14 22 26	
ne									
1.1,2-Trichioroethane	ND		1.1	0.29	ug/m3			12/10/14 22 26	
1 1-Dichloroethane	ND		0.81	0 11	ug/m3			12/10/14 22 26	
1.1-Dichloroethene	ND		0,79	0 13	ug/m3			12/10/14 22:26	
1,2,4-Trichlorobenzene	ND		7.4	0.73	ug/m3			12/10/14 22:26	
1,2,4-Trimethylbenzene	ND		0 98	0 31	ug/m3			12/10/14 22 26	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/10/14 22 26	
1 2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/10/14 22 26	
								10/10/14 20 20	
1,2-Dichloroethane	ND		0.81	0.19	ug/m3			12/10/14 22 26	

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-02-SU-PS-20141204

Lab Sample ID: 140-2440-2

Date Collected: 12/04/14 14:27 Date Received: 12/09/14 10:15

Matrix: Air

Sample Container: Summa Canister 6L

Analyte	Result Qualifier	RL	MDL	Unit	D Prepared	Analyzed	Dil Fac
1,2-Dichloropropane	ND	0,92	0.24	ug/m3		12/10/14 22:26	1
1,3,5-Trimethylbenzene	ND	0.98	0.32	ug/m3		12/10/14 22,26	1
1.3-Dichlorobenzene	ND	1.2	0.39	ug/m3		12/10/14 22:26	1
1,4-Dichtorobenzene	ND	1 2	0.38	ug/m3		12/10/14 22:26	1
Benzene	0.76	0.64	0.18	ug/m3		12/10/14 22:26	1
Benzyl chloride	ND	2.1	0.40	ug/m3		12/10/14 22:26	1
Bromomethane	ND	0.78	0.12	ug/m3		12/10/14 22:26	1
Carbon tetrachloride	0.44 J	1.3	0.24	ug/m3		12/10/14 22:26	1
Chlorobenzene	ND	0.92	0.23	ug/m3		12/10/14 22:26	1
Chloroethane	ND	0.53	0.092	ug/m3		12/10/14 22:25	1
Chloroform	ND	0.98	0.19	ug/m3		12/10/14 22:26	1
Chloromethane	2.1	1.0	0.33	ug/m3		12/10/14 22 26	1
cis-1 2-Dichloroelhene	ND	0.79	0,24	ug/m3		12/10/14 22 26	1
cis-1,3-Dichloropropene	ND	0,91	0.34	ug/m3		12/10/14 22:26	1
Dichlorodifluoromethane	2,5	0.99	0,34	ug/m3		12/10/14 22:26	1
Ethylbenzene	ND	0.87	0.30	ug/m3		12/10/14 22:26	1
1,2-Dibromoethane (EDB)	ND	1.5	0.34	ug/m3		12/10/14 22:26	1
Hexachlorobutadiene	NÖ	11	0.83	ug/m3		12/10/14 22:26	1
Methylene Chloride	4.5 JB (1	(1.7)	0.45	ug/m3		12/10/14 22 26	1
m-Xylene & p-Xylene	ND	0.87	0.52	ug/m3		12/10/14 22 26	1
o-Xylene	ND	0.87	0.26	ug/m3		12/10/14 22 26	1
Styrene	ND	0.85	0.25	ug/m3		12/10/14 22 26	1
Tetrachloroethene	ND	1.4	0.27	ug/m3		12/10/14 22:26	1
Toluene	0.96	0,75	0.45	ug/m3		12/10/14 22:26	1
trans-1,3-Dichloropropene	ND	0.91	0.22	ug/m3		12/10/14 22 26	1
Trichloroethene	ND	1.1	0.19	ug/m3		12/10/14 22 26	1
Trichlorofluoromethane	1.3	1.1	0.13	ug/m3		12/10/14 22 26	1
Vinyl chloride	ND	0.51	0.18	ug/m3		12/10/14 22 26	1
Surrogate	%Recovery Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromoffuorobenzene (Surr)	102	60 - 140				12/10/14 22:26	1

Client Sample ID: WAA-03-SU-PS-20141204

Date Collected: 12/04/14 15:02 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-3

Matrix: Air

Analyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dit Fac
1,1,1-Trichloroethane	ND	0.20	0.030	ppb v/v			12/10/14 23 09	1
1,1,2,2-Tetrachloroethane	ND	0.20	0.061	ppb v/v			12/10/14 23 09	1
1,1,2-Trichloro-1,2,2-trifluoroetha	0.12 J	0.20	0.031	ppb v/v			12/10/14 23:09	1
ne	_							
1,1,2-Trichloroethane	ND	0 20	0.054	ppb v/v			12/10/14 23:09	1
1,1-Dichloroethane	ND	0.20	0.026	ppb v/v			12/10/14 23:09	1
1,1-Dichloroethene	ND '	0.20	0.034	ppb v/v			12/10/14 23 09	1
1.2.4-Trichlorobenzene	ND	1.0	0,098	ppb v/v			12/10/14 23:09	1
1,2,4-Trimethylbenzene	0,12 J	0.20	0.063	ppb v/v			12/10/14 23 09	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.20	0.032	ppb v/v			12/10/14 23 09	1

HUE 24 Pet 15

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-03-SU-PS-20141204

Lab Sample ID: 140-2440-3

Date Collected: 12/04/14 15:02 Date Received: 12/09/14 10:15

Matrix: Air

Sample Container: Summa Canister 6L

nalyte	Result Qualifier	RL	MOL	Unit	D	Prepared	Analyzed	Dil Fac
2-Dichlorobenzene	ND	0.20	0.070	ppb v/v			12/10/14 23 09	1
2-Dichloroethane	ND	0.20	0.047	ppb v/v			12/10/14 23:09	1
2-Dichloropropane	ND	0.20	0 052	ppb v/v			12/10/14 23:09	1
3,5-Trimethylbenzene	ND	0.20	0.065	ppb v/v			12/10/14 23.09	1
3-Dichlorobenzene	ND	0.20	0.065	ppb v/v			12/10/14 23:09	1
4-Dichlorobenzene	ND	0.20	0.064	ppb v/v			12/10/14 23:09	1
enzene	0,27	0.20	0.056	ppb v/v			12/10/14 23:09	1
enzyl chloride	ND	0.40	0.078	ppb v/v			12/10/14 23:09	1
romomethane	ND	0.20	0.032	ppb v/v			12/10/14 23:09	1
arbon tetrachloride	0.11 J	0.20	0.038	ppb v/v			12/10/14 23 09	1
hlorobenzene	ND	0.20	0.049	ppb v/v			12/10/14 23 09	1
hloroethane	ND	0,20	0,035	ppb v/v			12/10/14 23:09	1
hloroform	ND	0,20	0.038	ppb v/v			12/10/14 23:09	- 1
hloromethane	1.0	0.50	0,16	ppb v/v			12/10/14 23:09	1
is-1,2-Dichloroethene	ND	0,20	0.060	ppb v∕v			12/10/14 23 09	1
is-1,3-Dichloropropene	ND	0.20	0.074	ppb v/v			12/10/14 23:09	1
ichlorodifluoromethane	0.55	0 20	0.068	ppb v/v			12/10/14 23:09	1
thylbenzene	0.069 J	0.20	0.068	ppb v/v			12/10/14 23 09	
.2-Dibromoethane (EDB)	ND	0.20	0.044	ppb v/v			12/10/14 23:09	
lexachlorobutadiene	NO	1.0	0,078	ppb v/v			12/10/14 23:09	
Nethylene Chloride	0.72 -	0.50	0.13	ppb v/v			12/10/14 23:09	
n-Xylene & p-Xylene	0.16 J	0.20	0_12	ppb v/v			12/10/14 23 09	
-Xylene	0.074 J	0.20	0.061	ppb v/v			12/10/14 23:09	
ityrene	ND	0.20	0.058	ppb v/v			12/10/14 23:09	
etrachloroethene	ND	0.20	0.040	ppb v/v			12/10/14 23:09	1
oluene	0.54	0,20	0.12	ppb v/v			12/10/14 23:09	1
rans-1,3-Dichloropropene	ND	0.20	0.048	ppb v/v			12/10/14 23 09	
richloroethene	ND	0.20	0.036	ppb v/v			12/10/14 23:09	
richlorofluoromethane	0,25	0.20		ppb v/v			12/10/14 23:09	
/inyl chloride	ND	0.20		ppb v/v			12/10/14 23 09	
Analyte	Result Qualifier	RL	MDt	Unit	D	Prepared	Analyzed	Dil Fac
,11-Trichloroethane	ND COUNTER	1.1		ug/m3		- repared	12/10/14 23 09	5
1,2,2-Tetrachloroethane	ND	1.4		ug/m3			12/10/14 23 09	
	0.83 J	1.5		ug/m3			12/10/14 23 09	
,1,2-Trichloro-1,2,2-trifluoroetha le	0.09 37	1.0	0.24	ugmo			1210/14 25 05	
,1,2-Trichloroethane	ND	1,1	0.29	ug/m3			12/10/14 23:09	
1-Dichloroethane	ND	0.81		ug/m3			12/10/14 23:09	
,1-Dichloroethene	ND *	0.79		ug/m3			12/10/14 23 09	
,2 4-Trichlorobenzene	ND	7.4		ug/m3			12/10/14 23 09	
2,4-Trimethylbenzene	0.60 J	0.98		ug/m3			12/10/14 23 09	
2-Dichloro-1,1,2,2-tetrafluoroethane	ND	1.4		ug/m3			12/10/14 23 09	
2-Dichlorobenzene	ND	1.2		ug/m3			12/10/14 23 09	
.2-Dichloroethane	ND	0,81		ug/m3			12/10/14 23 09	
,2-Dichloropropane	ND	0.92		ug/m3			12/10/14 23 09	
,3,5-Trimethylbenzene	ND	0.98		ug/m3			12/10/14 23 09	
3-Dichlorobenzene	ND	1.2		ug/m3			12/10/14 23 09	
1,4-Dichforobenzene	ND	1.2		ug/m3			12/10/14 23 09	
		0.64		ug/m3			12/10/14 23 09	
Benzene	0,85			-15	-		121 TUT 14 23 US	

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

Client Sample ID: WAA-03-SU-PS-20141204

Date Collected: 12/04/14 15:02 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-3

Matrix: Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzyt chloride	ND		2.1	0.40	ug/m3	14 MIN 54		12/10/14 23:09	1
Bromomethane	ND		0.78	0.12	ug/m3			12/10/14 23 09	1
Carbon tetrachloride	0.72	J	1.3	0.24	ug/m3			12/10/14 23.09	1
Chlorobenzene	ND		0 92	0.23	ug/m3			12/10/14 23 09	1
Chloroethane	ND		0,53	0.092	ug/m3			12/10/14 23 09	1
Chloroform	DN		0 98	0.19	ug/m3			12/10/14 23:09	1
Chloromethane	2.1		1.0	0,33	ug/m3			12/10/14 23:09	1
cis-1,2-Dichloroethene	ND		0.79	0.24	ug/m3			12/10/14 23:09	1
cis-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/10/14 23 09	1
Dichlorodifluoromethane	2.7		0.99	0.34	ug/m3			12/10/14 23 09	1
Ethylbenzene	0.30	J	0.87	0.30	ug/m3			12/10/14 23 09	1
1,2-Dibromoethane (EDB)	ND		1.5	0.34	ug/m3			12/10/14 23:09	1
Hexachlorobutadiene	ND		11	0 83	ug/m3			12/10/14 23:09	1
Methylene Chloride	2.5	8-7	1.7	0.45	ug/m3			12/10/14 23:09	1
m-Xylene & p-Xylene	0.69	J	0.87	0,52	ug/m3			12/10/14 23:09	1
o-Xylene	0.32	J	0.87	0.26	ug/m3			12/10/14 23 09	1
Styrene	ND		0,85	0.25	ug/m3			12/10/14 23:09	1
Tetrachloroethene	ND		1.4	0.27	ug/m3			12/10/14 23:09	1
Toluene	2,0		0.75	0.45	ug/m3			12/10/14 23:09	1
trans-1,3-Dichloropropene	ND		0.91	0.22	ug/m3			12/10/14 23 09	1
Trichloroethene	ND		1,1	0.19	ug/m3			12/10/14 23 09	1
Trichtorofluoromethane	1.4		1.1	0 13	ug/m3			12/10/14 23 09	1
Vinyl chloride	ND		0,51	0.18	ug/m3			12/10/14 23:09	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	102		60 - 140			1-		12/10/14 23 09	7

Client Sample ID: WAA-04-SU-PS-20141204

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-4

Matrix: Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		0.20	0.030	opb v/v			12/10/14 23:53	1.48
1.1,2,2-Tetrachloroethane	ND		0.20	0.061	ppb v/v			12/10/14 23:53	1.48
1,1,2-Trichloro-1,2,2-trifluoroetha	0.083	17.	0.20	0.031	ppb v/v			12/10/14 23:53	1.48
1,1,2-Trichloroethane	ND		0.20	0.054	ppb v/v			12/10/14 23:53	1.48
1,1-Dichloroethane	ND		0.20	0,026	ppb v/v			12/10/14 23 53	1,48
1 1-Dichloroethene	ND	•	0 20	0,034	ppb v/v			12/10/14 23:53	1 48
1,2,4-Trichlorobenzene	ND		1.0	0,098	ppb v/v			12/10/14 23:53	1,48
1,2 4-Trimethylbenzene	ND		0.20	0,063	ppb v/v			12/10/14 23 53	1.48
1 2-Dichloro-1,1 2,2-tetrafluoroethane	ND		0.20	0.032	ppb v/v			12/10/14 23 53	1 48
1,2-Dichlorobenzene	ND		0 20	0.070	ppb v/v			12/10/14 23 53	1 48
1,2-Dichloroethane	0.051	J	0 20	0.047	ppb v/v			12/10/14 23 53	1 48
1 2-Dichloropropane	ND		0 20	0.052	ppb v/v			12/10/14 23 53	1,48
1,3 5-Trimethylbenzene	ND		0 20	0.065	ppb v/v			12/10/14 23 53	1,48
1 3-Dichlorobenzene	МÐ		0 20	0.065	ppb v/v			12/10/14 23 53	1.48

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Client, Tetra Tech EM Inc. Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-04-SU-PS-20141204

Date Collected: 12/04/14 15:20

Date Received: 12/09/14 10:15 Sample Container: Summa Canister 6L Lab Sample ID: 140-2440-4

Matrix: Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
1,4-Dichlorobenzene	ND		0.20	0,064	ppb v/v		PAKE TO THE PARENT NAME OF THE P	12/10/14 23:53	1.4
Benzene	0,25		0.20	0.056	ppb v/v			12/10/14 23 53	1.4
Benzyl chloride	ND		0.40	0.078	ppb v/v			12/10/14 23 53	1.4
Bromomethane	ND		0.20	0.032	ppb v/v			12/10/14 23 53	1.4
Carbon tetrachloride	0.087	J	0.20	0.038	ppb v/v			12/10/14 23 53	1.4
Chlorobenzene	N D		0.20	0,049	ppb v/v			12/10/14 23.53	1.4
Chioroethane	ND		0.20	0.035	ppb v/v			12/10/14 23:53	1.4
Chloroform	ND		0.20	0,038	ppb v/v			12/10/14 23:53	1.4
Chloromethane	1.0		0.50	0.16	ppb v/v			12/10/14 23:53	1.4
cis-1,2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/10/14 23:53	1.4
cis-1,3-Dichloropropene	ND		0.20	0.074	ppb v/v			12/10/14 23:53	1.4
Dichlorodifluoromethane	0.43		0.20	0.068	ppb v/v			12/10/14 23:53	1.4
Ethylbenzene	ND		0.20	0.068	ppb v/v			12/10/14 23:53	1.4
1,2-Dibromoethane (ED8)	ND		0,20	0.044	ppb v/v			12/10/14 23:53	1.4
Hexachlorobutadiene	ND		1.0		ppb v/v			12/10/14 23:53	1.4
Methylene Chloride	0.36	JB U	0.50		ppb v/v			12/10/14 23:53	1.4
m-Xylene & p-Xylene	ND		0.20		ppb v/v			12/10/14 23:53	1.4
o-Xylene	0.064	J	0.20		ppb v/v			12/10/14 23:53	1.4
Styrene	ND	-	0.20		ppb v/v			12/10/14 23:53	1.4
Tetrachloroethene	ND		0.20		ppb v/v			12/10/14 23:53	1.4
Toluene	0.23		0.20		ppb v/v			12/10/14 23:53	1,4
trans-1,3-Dichloropropene	ND		0.20		ppb v/v			12/10/14 23:53	1.4
Trichloroethene	ND		0.20		ppb v/v			12/10/14 23:53	1,4
Trichlorafluoromethane	0.20		0,20		ppb v/v			12/10/14 23:53	1.4
Vinyl chlonde	ND		0.20		ppb v/v			12/10/14 23:53	1.4
Analyte		Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fa
1.1.1-Trichloroethane	ND		1.1		ug/m3		, repared	12/10/14 23 53	1.4
1,1,2,2-Tetrachloroelhane	ND		1.4		ug/m3			12/10/14 23:53	1.4
1,1,2-Trichloro-1,2,2-trifluoroetha		15	1.5		ug/m3			12/10/14 23:53	1.4
ne	0.03	27	, ,	0,24	ogrino			1270/14 25 50	11.4
1,1,2-Trichloroethane	ND		1.1	0.29	ug/m3			12/10/14 23:53	1.4
1,1-Dichloroethane	ND		0.81	0.11	ug/m3			12/10/14 23 53	1.4
1,1-Dichloroethene	ND	•	0.79		ug/m3			12/10/14 23:53	1.4
1.2,4-Trichlorobenzene	ND		7.4		ug/m3			12/10/14 23 53	1.4
1,2,4-Trimethylbenzene	ND		0.98		ug/m3			12/10/14 23:53	1.4
1,2-Dichloro-1,1 2,2-tetrafluoroethane	ND		1.4		ug/m3			12/10/14 23 53	1.4
1 2-Dichlorobenzene	ND		1.2		ug/m3			12/10/14 23:53	1.4
1,2-Dichloroethane	0.21	.1	0.81		ug/m3			12/10/14 23 53	1.4
1,2-Dichloropropane	ND	_	0.92		ug/m3			12/10/14 23 53	1.4
1.3.5-Trimethylbenzene	ND		0.98		ug/m3			12/10/14 23 53	1.4
1 3-Dichlorobenzene	ND		1.2		ug/m3			12/10/14 23:53	1.4
1 4-Dichlorobenzene	ND		1.2		ug/m3			12/10/14 23 53	1.4
Benzene	0.80		0.64		ug/m3			12/10/14 23:53	1.4
Benzyl chloride	ND.		2.1		ug/m3				1.4
Bromomethane	ND ND		0.78		-			12/10/14 23:53	
					ug/m3			12/10/14 23:53	1.4
Carbon letrachloride	0.54	J	1.3		ug/m3			12/10/14 23 53	1.4
Chlorobenzene	ND ND		0.92 0.53	0.23	ug/m3			12/10/14 23 53 12/10/14 23 53	1.4 1.4

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Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-04-SU-PS-20141204

Lab Sample ID: 140-2440-4

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Matrix: Air

Sample Container: Summa Canister 6L

Analyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	ND	0.98	0.19	ug/m3			12/10/14 23 53	1,48
Chloromethane	2.1	1,0	0.33	ug/m3			12/10/14 23.53	1.48
cis-1,2-Dichloroethene	ND	0.79	0 24	ug/m3			12/10/14 23:53	1.48
cis-1,3-Dichloropropene	ND	0,91	0.34	ug/m3			12/10/14 23:53	1.48
Dichlorodificoromethane	2.1	0.99	0,34	ug/m3			12/10/14 23:53	1.48
Ethylbenzene	ND	0.87	0.30	ug/m3			12/10/14 23:53	1,48
1,2-Dibromoethane (EDB)	ND	1.5	0.34	ug/m3			12/10/14 23.53	1.48
Hexachlorobutadiene	DM	11	0.83	ug/m3			12/10/14 23 53	1.48
Methylene Chloride	-1.2 JB U	1.7	0.45	ug/m3			12/10/14 23:53	1.48
m-Xylene & p-Xylene	ND	0.87	0.52	ug/m3			12/10/14 23:53	1.48
o-Xylene	0,28 J	0,87	0.26	ug/m3			12/10/14 23:53	1.48
Styrene	ND	0.85	0.25	ug/m3			12/10/14 23:53	1.48
Tetrachloroethene	ND	1.4	0,27	ug/m3			12/10/14 23:53	1.48
Toluene	0.86	0.75	0 45	ug/m3			12/10/14 23:53	1.48
trans-1,3-Dichloropropene	ND	0.91	0.22	ug/m3			12/10/14 23:53	1,48
Trichloroethene	ND	1.1	0.19	ug/m3			12/10/14 23:53	1.48
Trichlorofluoromethane	1.1	1.1	0.13	ug/m3			12/10/14 23:53	1 48
Vinyl chloride	ND	0.51	0.18	ug/m3			12/10/14 23:53	1.48
Surrogate	%Recovery Qualifier	Límits				Propared	Analyzed	Dil Fa
4-Bromofluorobenzene (Surr)	103	60 - 140					12/10/14 23:53	1.48

Client Sample ID: WAA-05-SU-PS-20141204

Date Collected: 12/04/14 14:45

Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-5

Matrix: Air

Analyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichtoroethane	ND	0.20	0.030	ppb v/v			12/11/14 00 35	1
1,1,2,2-Tetrachloroethane	ND	0.20	0.061	ppb v/v			12/11/14 00 35	1
1,1,2-Trichloro-1,2,2-trifluoroetha	0.087 🏋	0.20	0.031	ppb v/v			12/11/14 00:35	1
ne								
1,1,2-Trichloroethane	ND	0.20	0.054	ppb v/v			12/11/14 00 35	1
1,1-Dichloroethane	ND	0.20	0.026	ppb v/v			12/11/14 00 35	1
1,1-Dichloroethene	ND *	0.20	0.034	ppb v/v			12/11/14 00:35	1
1,2,4-Trichlorobenzene	NO	1.0	0.098	ppb v/v			12/11/14 00:35	1
1,2,4-Trimethylbenzene	ND	0.20	0.063	ppb v/v			12/11/14 00 35	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.20	0,032	ppb v/v			12/11/14 00 35	1
1,2-Dichlorobenzene	ND	0.20	0.070	ppb v/v			12/11/14 00:35	1
1 2-Dichloroethane	ND	0.20	0.047	ppb v/v			12/11/14 00 35	-1
1.2-Dichloropropane	ND	0.20	0.052	ppb v/v			12/11/14 00:35	1
1.3 5-Trimethylbenzene	ND	0.20	0.065	ppb v/v			12/11/14 00 35	1
1,3-Dichlorobenzene	ND	0.20	0.065	ppb v/v			12/11/14 00:35	1
1,4-Dichlorobenzene	ND	0.20	0.064	ppb v/v			12/11/14 00:35	1
Benzene	0.27	0.20	0.056	ppb v/v			12/11/14 00 35	1
Benzy) ch(oride	ND	0 40	0.078	ppb v/v			12/11/14 00 35	1
Bromomethane	ND	0.20	0 032	ppb v/v			12/11/14 00 35	1
Carbon tetrachloride	0.079 J	30,20	ഗാദ	ካያኒ ተነቀ፣			12/11/14 00 35	1

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Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-5

Matrix: Air

Client Sample ID: WAA-05-SU-PS-20141204

Date Collected: 12/04/14 14:45 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Chlorobenzene	ND		0.20	0.049	ppb v/v		- American American	12/11/14 00:35	ars.
Chloroethane	ND		0.20	0.035	ppb v/v			12/11/14 00:35	
Chloroform	ND		0.20	0.038	ppb v/v			12/11/14 00 35	
Chloromethane	1,1		0.50	0.16	ppb v/v			12/11/14 00:35	
is-1 2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/11/14 00:35	
is-1,3-Dichloropropene	ND		0,20	0.074	ppb v/v			12/11/14 00:35	
Dichlorodifluoromethane	0.43		0.20	0.068	ppb v/v			12/11/14 00:35	
Ethylbenzene	ND		0,20	0 068	ppb v/v			12/11/14 00:35	
,2-Dibromoethane (EDB)	ND		0.20	0 044	ppb v/v			12/11/14 00 35	
lexachlorobutadiene	ND		1.0	0.078	ppb v/v			12/11/14 00:35	
Methylene Chloride	0.31	JB M	(0.50)	0.13	ppb v/v			12/11/14 00:35	
n-Xylene & p-Xylene	ND		0.20	0.12	ppb v/v			12/11/14 00:35	
-Xylene	ND		0.20	0.061	ppb v/v			12/11/14 00:35	
Styrene	ND		0.20		ppb v/v			12/11/14 00 35	
[etrachloroethene	ND		0.20		ppb v/v			12/11/14 00 35	
oluene	0.25		0.20		ppb v/v			12/11/14 00:35	
rans-1,3-Dichloropropene	ND		0.20		ppb v/v			12/11/14 00:35	
richloroethene	0.053	J	0.20		ppb v/v			12/11/14 00:35	
richlorofluoromethane	0,22	-	0 20		ppb v/v			12/11/14 00:35	
/inyl chloride	ND		0.20		ppb v/v			12/11/14 00:35	
nalyte		Qualifier	RL		Unit	D	Prepared	Analyzed	Dil F
,1,1-Trichioroethane	ND		1.1		ug/m3		10 -11-	12/11/14 00:35	
.1,2,2-Tetrachioroethane	ND		1.4		ug/m3			12/11/14 00:35	
,1,2-Trichloro-1,2,2-trifluoroetha	0.67	77	1,5		ug/m3			12/11/14 00 35	
ne	575,	2							
,1,2-Trichloroethane	ND		1.1	0.29	ug/m3			12/11/14 00 35	
,1-Dichloroethane	ND		0,81	0.11	ug/m3			12/11/14 00 35	
,1-Dichloroethene	ИD	•	0.79	0.13	ug/m3			12/11/14 00 35	
,2.4-Trichlorobenzene	ND		7.4	0.73	ug/m3			12/11/14 00.35	
,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/11/14 00:35	
2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/11/14 00:35	
,2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/11/14 00:35	
,2-Dichloroethane	ND		0.81	0 19	ug/m3			12/11/14 00.35	
1,2-Dichloropropane	ND		0.92	0.24	ug/m3			12/11/14 00 35	
1,3,5-Trimethylbenzene	ND		0.98	0 32	ug/m3			12/11/14 00:35	
.3-Dichlorobenzene	ND		1.2	0.39	ug/m3			12/11/14 00 35	
4-Dichlorobenzene	ND		1.2		ug/m3			12/11/14 00:35	
3enzene	0.87		0.64		ug/m3			12/11/14 00 35	
Benzyl chloride	ND		2 1		ug/m3			12/11/14 00 35	
Bromomethane	ND		0.78		ug/m3			12/11/14 00:35	
Carbon tetrachloride	0.50	J	1.3		ug/m3			12/11/14 00:35	
Chlorabenzene	ND		0.92		ug/m3			12/11/14 00 35	
Chloroethane	ND		0.53		ug/m3			12/11/14 00:35	
Chloroform	ND		0.98		ug/m3			12/11/14 00:35	
Chloromethane	2.3		1.0		ug/m3			12/11/14 00:35	
ds-1,2-Dichloroethene	ND		0 79		ug/m3			12/11/14 00:35	
tis-1.3-Dichloropropene	ND		0.91		ug/m3			12/11/14 00 35	
Dichlorodifluoromethane	2.1		0.99		ug/m3			12/11/14 00 35	

HUE 2412615

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-5

Matrix: Air

Client Sample ID: WAA-05-SU-PS-20141204

Date Collected: 12/04/14 14:45 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Analyte	Result Qualifier	RL	MOL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	ND	0.87	0.30	ug/m3			12/11/14 00:35	1
1.2-Dibromoethane (EDB)	ND	1.5	0.34	ug/m3			12/11/14 00 35	1
Hexachlorobutadiene	ND	11	0.83	ug/m3			12/11/14 00 35	1
Methylene Chioride	1.1 JB U	(1.7)	0.45	ug/m3			12/11/14 00 35	1
m-Xylene & p-Xylene	NĎ	0.87	0.52	ug/m3			12/11/14 00:35	1
о-Хуlеле	ND	0.87	0.26	ug/m3			12/11/14 00 35	1
Styrene	ND	0.85	0,25	ug/m3			12/11/14 00 35	1
Tetrachloroethene	ND	1.4	0,27	ug/m3			12/11/14 00 35	1
Toluene	0.95	0:75	0.45	ug/m3			12/11/14 00 35	1
trans-1,3-Dichloropropene	ND	0 91	0.22	ug/m3			12/11/14 00:35	1
Trichloroethene	0.29 J	1.1	0,19	ug/m3			12/11/14 00:35	1
Trichlorofluoromethane	1.2	1.1	0.13	ug/m3			12/11/14 00:35	1
Vinyl chloride	ND	0.51	0.18	ug/m3			12/11/14 00:35	1
Surrogate	%Recovery Qualifier	Limits				Prepared	Analyzed	Dit Fac
4-Bromofluorobenzene (Surr)	98	60 - 140					12/11/14 00:35	1

Client Sample ID: WAA-04-SU-DU-20141204

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-6

Matrix: Air

Analyte	Result Qualifie	r RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND	0.20	0.030	ppb v/v			12/11/14 01:17	1
1,1,2,2-Tetrachloroethane	ND	0.20	0.061	ppb v/v			12/11/14 01:17	1
1,1,2-Trichloro-1,2,2-trifluoroetha	0.088	0.20	0.031	ppb v/v			12/11/14 01:17	1
ne								
1,1,2-Trichloroethane	ND	0.20	0.054	ppb v/v			12/11/14 01:17	1
1 1-Dichloroelhane	ND	0.20	0.026	ppb v/v			12/11/14 01.17	1
1,1-Dichloroethene	ND *	0.20	0,034	ppb v/v			12/11/14 01:17	1
1.2.4-Trichlorobenzene	ND	1.0	0.098	ppb v/v			12/11/14 01:17	1
1,2,4-Trimethylbenzene	ND	0.20	0.063	ppb v/v			12/11/14 01:17	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.20	0.032	ppb v/v			12/11/14 01:17	1
1,2-Dichlorobenzene	ND	0.20	0.070	ppb v/v			12/11/14 01:17	1
1,2-Dichloroethane	ND	0,20	0.047	ppb v/v			12/11/14 01:17	1
1,2-Dichloropropane	ND	0.20	0.052	ppb v/v			12/11/14 01 17	1
1,3,5-Trimethylbenzene	ND	0.20	0.065	ppb v/v			12/11/14 01:17	1
1,3-Dichlorobenzene	ND	0.20	0.065	ppb v/v			12/11/14 01:17	1
1,4-Dichlorobenzene	ND	0.20	0.064	ppb v/v			12/11/14 01:17	1
Benzene	0.21	0.20	0 056	ppb v/v			12/11/14 01 17	1
Benzyl chloride	ND	0.40	0,078	ppb v/v			12/11/14 01 17	1
Bromomethane	ND	0 20	0.032	ppb v/v			12/11/14 01.17	1
Carbon tetrachloride	0.065 J	0.20	0 038	ppb v/v			12/11/14 01:17	1
Chlorobenzene	ND	0,20	0.049	ppb v/v			12/11/14 01 17	1
Chloroethane	ND	0.20	0.035	ppb v/v			12/11/14 01/17	1
Chloroform	ND	0.20	0.038	ppb v/v			12/11/14 01 17	1
Chloromethane	1.1	0 50	0 16	ppb v/v			12/11/14 01:17	1
cis-1 2-Dichloroethene	ND	0.20	0.060	ppb v/v			12/11/14 01 17	1

HUF 24 Feb 15

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID 140-2440-1

Lab Sample ID: 140-2440-6

Matrix: Air

Client Sample ID: WAA-04-SU-DU-20141204

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

nalyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil F
s-1,3-Dichloropropene	ND	0.20	0.074	ppb v/v			12/11/14 01:17	
chlorodifluoromethane	0.52	0.20	0.068	ppb v/v			12/11/14 01 17	
hylbenzene	ND	0.20	0.068	ppb v/v			12/11/14 01:17	
2-Dibromoethane (EDB)	ND	0.20	0.044	ppb v/v			12/11/14 01:17	
exachlorobutadiene	ND	1.0	0,078	ppb v/v			12/11/14 01:17	
ethylene Chloride	0.35 JB U	0.50	0.13	ppb v/v			12/11/14 01 17	
-Xylene & p-Xylene	ND	0.20	0.12	ppb v/v			12/11/14 01.17	
Xylene	ND	0.20	0 061	ppb v/v			12/11/14 01 17	
yrene	ND	0.20	0.058	ppb v/v			12/11/14 01:17	
etrachloroethene	ND	0.20	0.040	ppb v/v			12/11/14 01 17	
oluene	0.21	0.20	0.12	ppb v/v			12/11/14 01:17	
ans-1,3-Dichloropropene	ND	0.20		ppb v/v			12/11/14 01 17	
chloroethene	ND	0.20		ppb v/v			12/11/14 01:17	
richlorofluoromethane	0.24	0.20		ppb v/v			12/11/14 01:17	
nyl chloride	ND	0.20		ppb v/v			12/11/14 01:17	
nalyte	Result Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil F
1,1-Trichloroethane	ND	1.1		ug/m3			12/11/14 01:17	
1,2,2-Tetrachloroethane	ND	1.4		ug/m3			12/11/14 01:17	
1,2-Trichloro-1,2,2-trifluoroetha	7C 88.0	1.5		ug/m3			12/11/14 01:17	
9	5.50		•					
1,2-Trichloroethane	ND	1.1	0.29	ug/m3			12/11/14 01:17	
1-Dichloroethane	ND	0.81	0.11	ug/m3			12/11/14 01:17	
1-Dichloroethene	ND *	0.79	0.13	ug/m3			12/11/14 01:17	
2,4-Trichlorobenzene	ND	7.4	0.73	ug/m3			12/11/14 01:17	
2,4-Trimethylbenzene	ND	0.98	0.31	ug/m3			12/11/14 01.17	
2-Dichloro-1,1,2,2-tetrafluoroethane	ND	1,4	0,22	ug/m3			12/11/14 01:17	
2-Dichlorobenzene	ND	1.2		ug/m3			12/11/14 01:17	
2-Dichloroethane	ND	0,81	0,19	•			12/11/14 01:17	
2-Dichloropropane	ND	0.92		ug/m3			12/11/14 01:17	
3,5-Trimethylbenzene	ND	0,98		ug/m3			12/11/14 01:17	
3-Dichlorobenzene	ND	1.2		ug/m3			12/11/14 01:17	
4-Dichlorobenzene	ND	1.2		ug/m3			12/11/14 01:17	
enzene	0,66	0.64		ug/m3			12/11/14 01:17	
enzene enzyl chloride	O, OO	2,1	0.40	ug/m3			12/11/14 01:17	
romomethane	ND	0.78		ug/m3			12/11/14 01:17	
arbon tetrachloride	0.41 J	1.3		ug/m3			12/11/14 01 17	
hlorobenzene	ND	0.92		ug/m3			12/11/14 01 17	
hioroethane	ND	0,53		ug/m3			12/11/14 01 17	
hioroform	ND	0.98		ug/m3			12/11/14 01 17	
		1.0		ug/m3			12/11/14 01:17	
hloromethane s-1,2-Dichloroethene	2.3 ND	0.79		ug/m3			12/11/14 01 17	
				•				
s-1,3-Dichloropropene	ND	0.91		ug/m3			12/11/14 01 17	
ichlorod/fluoromethane	2.6	0.99		ug/m3			12/11/14 01 17	
thylbenzene	ND	0.87		ug/m3			12/11/14 01 17	
2-Dibromoethane (EDB)	ND ND	1.5		ug/m3			12/11/14 01 17	
exachlorobuladiene	ND CA	11		ug/m3			12/11/14 01 17	
lethylene Chloride	12 JB	17	0,45	ug/m3			12/11/14 01 17	

HVF 24 Pet 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

Client Sample ID: WAA-04-SU-DU-20141204

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-6

Matrix: Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
o-Xylene	ND		0.87	0.26	ug/m3			12/11/14 01:17	1
Styrene	ND		0.85	0.25	ug/m3			12/11/14 01.17	1
Tetrachloroethene	ND		1.4	0.27	ug/m3			12/11/14 01:17	1
Toluene	0.79		0.75	0.45	ug/m3			12/11/14 01:17	1
trans-1,3-Dichloropropene	ND		0.91	0.22	ug/m3			12/11/14 01:17	1
Trichloroethene	ND		1.1	0.19	ug/m3			12/11/14 01:17	1
Trichlorofisoromethane	1.4		1.1	0.13	ug/m3			12/11/14 01:17	1
Vinyl chloride	ND		0.51	0.18	ug/m3			12/11/14 01:17	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	100		60 - 140					12/11/14 01:17	1

Client Sample ID: WAA-00-SU-TB-20141204

Date Collected: 12/04/14 16:45 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-7

Matrix: Air

Analyte	Result Qual	ifier RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND	0.20	0.030	ppb v/v			12/11/14 02:01	1
1,1,2,2-Tetrachloroethane	ND	0,20	0,061	ppb v/v			12/11/14 02:01	1
1,1,2-Trichloro-1,2,2-trifluoroelhane	ND *	0.20	0.031	ppb v/v			12/11/14 02:01	1
1,1,2-Trichloroethane	ND	0,20	0.054	ppb v/v			12/11/14 02:01	1
1.1-Dichloroethane	ND	0.20	0.026	ppb v/v			12/11/14 02 01	1
1,1-Dichloroethene	ND *	0.20	0.034	ppb v/v			12/11/14 02 01	1
1,2,4-Trichlorobenzene	ND	1.0	0.098	ppb v/v			12/11/14 02 01	1
1.2.4-Trimethylbenzene	П	0,20	0.063	ppb v/v			12/11/14 02:01	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	0.20	0.032	ppb v/v			12/11/14 02 01	1
1,2-Dichlorobenzene	ND	0 20	0.070	ppb v/v			12/11/14 02:01	1
1,2-Dichloroethane	ND	0 20	0.047	ppb v/v			12/11/14 02:01	1
1,2-Dichloropropane	ПN	0.20	0.052	ppb v/v			12/11/14 02:01	1
1,3,5-Trimethylbenzene	ND	0.20	0.065	ppb v/v			12/11/14 02:01	1
1,3-Dichlarabenzene	ND	0.20	0.065	ppb v/v			12/11/14 02:01	1
1,4-Dichlorobenzene	ND	0.20	0.064	ppb v/v			12/11/14 02:01	1
Benzene	ND	0.20	0.056	ppb v/v			12/11/14 02 01	1
Benzyl chloride	ND	0.40	0.078	ppb v/v			12/11/14 02:01	1
Bromomethane	ND	0 20	0.032	ppb v/v			12/11/14 02 01	1
Carbon tetrachloride	ND	0 20	0 038	ppb v/v			12/11/14 02 01	1
Chlorobenzene	ND	0.20	0 049	ppb v/v			12/11/14 02:01	1
Chloroethane	ND	0,20	0,035	ppb v/v			12/11/14 02:01	1
Chloroform	ND	0 20	0 038	ppb v/v			12/11/14 02 01	1
Chioromethane	ND	0,50	0.16	ppb v/v			12/11/14 02 01	1
cis-1,2-Dichloroethene	ND	0.20	0.060	ppb v/v			12/11/14 02 01	1
cis-1,3-Dichloropropene	ND	0,20	0.074	ppb v/v			12/11/14 02 01	1
Dichlorodifluoromethane	ND	0.20	0.068	ppb v/v			12/11/14 02 01	1
Ethylbenzene	ND	0.20	0.068	ppb v/v			12/11/14 02:01	1
1,2-Dibromoethane (EDB)	ND	0.50	0.044	ppb v/v			12/11/14 02 01	1
Hexachlorobuladiene	ND	1.0	0.078	ppb v/v			12/11/14 02 01	1
Methylene Chloride	0.25 JB	(0.50)		ppb v/v			12/11/14 02 01	1

HUF 24 Pol 15

Client, Tetra Tech EM Inc. Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-00-SU-TB-20141204

Date Collected: 12/04/14 16:45 Date Received: 12/09/14 10:15

Sample Container: Summa Canister 6L

Lab Sample ID: 140-2440-7

Matrix: Air

Analyte	Result	Qualifler	RL	MDL	Unit	D	Prepared	Analyzed	Oil Fac
m-Xylene & p-Xylene	ND		0.20	0.12	ppb v/v		en filmeren in 15m yez por immeren im 6e te	12/11/14 02 01	1
o-Xylene	ND		0,20	0.061	ppb v/v			12/11/14 02 01	1
Styrene	ND		0.20	0.058	ppb v/v			12/11/14 02:01	1
Tetrachloroethene	ND		0.20	0.040	ppb v/v			12/11/14 02:01	1
Toluene	ND		0,20	0,12	ppb v/v			12/11/14 02 01	1
trans-1,3-Dichloropropene	ND		0.20	0.048	v/v dqq			12/11/14 02:01	1
Trichloroethene	ND		0.20	0,036	ppb v/v			12/11/14 02 01	1
Trichlorofluoromethane	ND		0.20	0.024	v\v dqq			12/11/14 02:01	1
Vinyl chloride	ND		0.20	0.071	ppb v/v			12/11/14 02 01	1
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		1,1	0,16	ug/m3		•	12/11/14 02:01	1
1,1,2,2-Tetrachloroethane	ON		1.4	0.42	ug/m3			12/11/14 02:01	1
1,1,2-Trichtoro-1,2,2-trifluoroethane	ND	•	1.5		ug/m3			12/11/14 02:01	1
1,1,2-Trichloroethane	ND		1.1	0.29	ug/m3			12/11/14 02:01	1
1,1-Dichloroethane	ND		0.81		ug/m3			12/11/14 02:01	1
1 1-Dichloroethene	ND	•	0.79	0.13	ug/m3			12/11/14 02:01	1
1,2,4-Trichlorobenzene	ND		7.4	0.73	ug/m3			12/11/14 02 01	1
1,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/11/14 02:01	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4		ug/m3			12/11/14 02:01	1
1,2-Dichlorobenzene	ND		1.2		ug/m3			12/11/14 02 01	1
1,2-Dichjoroethane	ND		0.81	0.19	ug/m3			12/11/14 02 01	-
1,2-Dichloropropane	ND		0.92		ug/m3			12/11/14 02 01	
1,3,5-Trimethylbenzene	ND		0.98	0.32	ug/m3			12/11/14 02:01	1
1,3-Dichlorobenzene	ND		1.2	0,39	ug/m3			12/11/14 02:01	1
1,4-Dichlorobenzene	ND		1.2	0.38	ug/m3			12/11/14 02:01	1
Benzene	ND		0 64	0,18	ug/m3			12/11/14 02 01	1
Benzy) chloride	ND		2.1	0.40	ug/m3			12/11/14 02:01	1
Bromomethane	ND		0.78	0.12	ug/m3			12/11/14 02:01	1
Carbon tetrachloride	ND		1.3	0.24	ug/m3			12/11/14 02 01	4
Chlorobenzene	ND		0.92	0.23	ug/m3			12/11/14 02 01	1
Chloroethane	ND		0.53	0.092	ug/m3			12/11/14 02 01	1
Chloroform	ND		0.98	0.19	ug/m3			12/11/14 02:01	
Chloromethane	ND		1.0	0.33	ug/m3			12/11/14 02:01	1
cis-1,2-Dichloroethene	DN		0.79	0 24	ug/m3			12/11/14 02 01	1
cis-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/11/14 02:01	1
Dichlorodifluoromethane	ND		0.99	0 34	ug/m3			12/11/14 02:01	1
Ethylbenzene	ND		0.87	0.30	ug/m3			12/11/14 02 01	1
1 2-Dibromoethane (EDB)	ND		1.5		ug/m3			12/11/14 02 01	1
Hexachlorobutadiene	ND		11		ug/m3			12/11/14 02:01	1
Methylene Chloride	0.85	TB CI	(1.7)		ug/m3			12/11/14 02 01	-
m-Xylene & p-Xylene	ND	-	0.87		ug/m3			12/11/14 02:01	1
o-Xylene	ND		0.87		ug/m3			12/11/14 02 01	1
Styrene	ND		0.85		ug/m3			12/11/14 02:01	1
Tetrachloroethene	ND		1,4		ug/m3			12/11/14 02:01	
Toluene	ND		0.75		ug/m3			12/11/14 02 01	
trans-1 3-Dichloropropene	ND		0.91		ug/m3			12/11/14 02:01	1
Trichloroethene	ND		1 1		ug/m3			12/11/14 02:01	1
Trichlorofluoromethane	ND		1.1		ug/m3			12/11/14 02 01	1

HUFZYPOLIS

TestAmerica Knoxville

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Client Sample ID: WAA-00-SU-TB-20141204

Date Collected: 12/04/14 16:45

Date Received: 12/09/14 10:15 Sample Container: Summa Canister 6L Lab Sample ID: 140-2440-7

Matrix: Air

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	ND	-	0.51	0.18	ug/m3		76 N 6 0 2 (A A PER A LA L	12/11/14 02:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	%Recovery	Qualitier	60 - 140				Prepared	12/11/14 02 01	

24 Feb 15

Surrogate Summary

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

5

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Matrix: Air Prep Type: Total/NA

		BFB	Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	(60-140)	
140-2440-1	WAA-01-SU-PS-20141204	100	
140-2440-2	WAA-02-SU-PS-20141204	102	
140-2440-3	WAA-03-SU-PS-20141204	102	
140-2440-4	WAA-04-SU-PS-20141204	103	
140-2440-5	WAA-05-SU-PS-20141204	98	
140-2440-6	WAA-04-SU-DU-20141204	100	
140-2440-7	WAA-00-SU-TB-20141204	107	
LCS 140-2031/1002	Lab Control Sample	106	
MB 140-2031/4	Method Blank	103	
Surrogate Legend			

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TestAmerica Job ID: 140-2440-1

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill

Method: TO-15 - Volatile Organic Compounds in Ambient Air

Lab Sample ID: MB 140-2031/4

Matrix: Air

Analysis Batch: 2031

1,1-Dichloroethene

1,2,4-Trichlorobenzene

Client Sample ID: Method Blank Prep Type: Total/NA

		МВ							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		0.20	0.030	ppb v/v			12/10/14 16:06	1
1,1,2,2-Tetrachloroethane	ND		0.20	0.061	ppb v/v			12/10/14 16:06	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		0.20	0.031	ppb v/v			12/10/14 16:06	1
1,1,2-Trichloroethane	ND		0.20	0.054	ppb v/v			12/10/14 16:06	1
1,1-Dichloroethane	ND		0.20	0.026	ppb v/v			12/10/14 16:06	1
1,1-Dichloroethene	ND		0.20	0.034	ppb v/v			12/10/14 16:06	1
1,2,4-Trichlorobenzene	ND		1.0	0.098	ppb v/v			12/10/14 16:06	1
1,2,4-Trimethylbenzene	ND		0.20	0.063	ppb v/v			12/10/14 16:06	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		0.20	0.032	ppb v/v			12/10/14 16:06	1
1,2-Dichlorobenzene	ND		0.20	0.070	ppb v/v			12/10/14 16:06	1
1,2-Dichloroethane	ND		0.20	0.047	ppb v/v			12/10/14 16:06	1
1,2-Dichloropropane	ND		0.20	0.052	ppb v/v			12/10/14 16:06	1
1,3,5-Trimethylbenzene	ND		0.20	0.065	ppb v/v			12/10/14 16:06	1
1,3-Dichlorobenzene	ND		0.20	0.065	ppb v/v			12/10/14 16:06	1
1,4-Dichlorobenzene	ND		0.20	0.064	ppb v/v			12/10/14 16:06	1
Benzene	ND		0.20	0.056	ppb v/v			12/10/14 16:06	1
Benzyl chloride	ND		0.40	0.078	ppb v/v			12/10/14 16:06	1
Bromomethane	ND		0.20	0.032	ppb v/v			12/10/14 16:06	1
Carbon tetrachloride	ND		0.20	0.038	ppb v/v			12/10/14 16:06	1
Chlorobenzene	ND		0.20	0.049	ppb v/v			12/10/14 16:06	1
Chloroethane	ND		0.20	0.035	ppb v/v			12/10/14 16:06	1
Chloroform	ND		0.20	0.038	ppb v/v			12/10/14 16:06	1
Chloromethane	ND		0.50	0.16	ppb v/v			12/10/14 16:06	1
cis-1,2-Dichloroethene	ND		0.20	0.060	ppb v/v			12/10/14 16:06	1
cis-1,3-Dichloropropene	ND		0.20	0.074	ppb v/v			12/10/14 16:06	1
Dichlorodifluoromethane	ND		0.20	0.068	ppb v/v			12/10/14 16:06	1
Ethylbenzene	ND		0.20	0.068	ppb v/v			12/10/14 16:06	1
1,2-Dibromoethane (EDB)	ND		0.20	0.044	ppb v/v			12/10/14 16:06	1
Hexachlorobutadiene	ND		1.0	0.078	ppb v/v			12/10/14 16:06	1
Methylene Chloride	0.251	J	0.50	0.13	ppb v/v			12/10/14 16:06	1
m-Xylene & p-Xylene	ND		0.20	0.12	ppb v/v			12/10/14 16:06	1
o-Xylene	ND		0.20	0.061	ppb v/v			12/10/14 16:06	1
Styrene	ND		0.20	0.058	ppb v/v			12/10/14 16:06	1
Tetrachloroethene	ND		0.20	0.040	ppb v/v			12/10/14 16:06	1
Toluene	ND		0.20	0.12	ppb v/v			12/10/14 16:06	1
trans-1,3-Dichloropropene	ND		0.20		ppb v/v			12/10/14 16:06	1
Trichloroethene	ND		0.20	0.036	ppb v/v			12/10/14 16:06	1
Trichlorofluoromethane	ND		0.20	0.024	ppb v/v			12/10/14 16:06	1
Vinyl chloride	ND		0.20	0.071	ppb v/v			12/10/14 16:06	1
•	МВ	МВ							
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		1.1		ug/m3		•	12/10/14 16:06	1
1,1,2,2-Tetrachloroethane	ND		1.4		ug/m3			12/10/14 16:06	1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		1.5		ug/m3			12/10/14 16:06	1
1,1,2-Trichloroethane	ND		1.1		ug/m3			12/10/14 16:06	1
1,1-Dichloroethane	ND		0.81		ug/m3			12/10/14 16:06	1
A A District of the control of the c			0.70	0.10	, ,			1011011111000	

TestAmerica Knoxville

12/10/14 16:06

12/10/14 16:06

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0.79

7.4

0.13 ug/m3

0.73 ug/m3

ND

ND

1 1 5

2

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6

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TestAmerica Job ID: 140-2440-1

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill

Lab Sample ID: MB 140-2031/4

4

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Client Sample ID: Method Blank Prep Type: Total/NA

Matrix: Air

Analysis Batch: 2031

	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trimethylbenzene	ND		0.98	0.31	ug/m3			12/10/14 16:06	1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND		1.4	0.22	ug/m3			12/10/14 16:06	1
1,2-Dichlorobenzene	ND		1.2	0.42	ug/m3			12/10/14 16:06	1
1,2-Dichloroethane	ND		0.81	0.19	ug/m3			12/10/14 16:06	1
1,2-Dichloropropane	ND		0.92	0.24	ug/m3			12/10/14 16:06	1
1,3,5-Trimethylbenzene	ND		0.98	0.32	ug/m3			12/10/14 16:06	1
1,3-Dichlorobenzene	ND		1.2	0.39	ug/m3			12/10/14 16:06	1
1,4-Dichlorobenzene	ND		1.2	0.38	ug/m3			12/10/14 16:06	1
Benzene	ND		0.64	0.18	ug/m3			12/10/14 16:06	1
Benzyl chloride	ND		2.1	0.40	ug/m3			12/10/14 16:06	1
Bromomethane	ND		0.78	0.12	ug/m3			12/10/14 16:06	1
Carbon tetrachloride	ND		1.3	0.24	ug/m3			12/10/14 16:06	1
Chlorobenzene	ND		0.92	0.23	ug/m3			12/10/14 16:06	1
Chloroethane	ND		0.53	0.092	ug/m3			12/10/14 16:06	1
Chloroform	ND		0.98	0.19	ug/m3			12/10/14 16:06	1
Chloromethane	ND		1.0	0.33	ug/m3			12/10/14 16:06	1
cis-1,2-Dichloroethene	ND		0.79	0.24	ug/m3			12/10/14 16:06	1
cis-1,3-Dichloropropene	ND		0.91	0.34	ug/m3			12/10/14 16:06	1
Dichlorodifluoromethane	ND		0.99	0.34	ug/m3			12/10/14 16:06	1
Ethylbenzene	ND		0.87	0.30	ug/m3			12/10/14 16:06	1
1,2-Dibromoethane (EDB)	ND		1.5	0.34	ug/m3			12/10/14 16:06	1
Hexachlorobutadiene	ND		11	0.83	ug/m3			12/10/14 16:06	1
Methylene Chloride	0.870	J	1.7	0.45	ug/m3			12/10/14 16:06	1
m-Xylene & p-Xylene	ND		0.87	0.52	ug/m3			12/10/14 16:06	1
o-Xylene	ND		0.87	0.26	ug/m3			12/10/14 16:06	1
Styrene	ND		0.85	0.25	ug/m3			12/10/14 16:06	1
Tetrachloroethene	ND		1.4	0.27	ug/m3			12/10/14 16:06	1
Toluene	ND		0.75	0.45	ug/m3			12/10/14 16:06	1
trans-1,3-Dichloropropene	ND		0.91	0.22	ug/m3			12/10/14 16:06	1
Trichloroethene	ND		1.1	0.19	ug/m3			12/10/14 16:06	1
Trichlorofluoromethane	ND		1.1	0.13	ug/m3			12/10/14 16:06	1
Vinyl chloride	ND		0.51	0.18	ug/m3			12/10/14 16:06	1
	МВ	МВ							

Lab Sample ID: LCS 140-2031/1002

Matrix: Air

Surrogate

Analysis Batch: 2031

4-Bromofluorobenzene (Surr)

Client Sample ID: Lab Control Sample	
Prep Type: Total/NA	

Prepared

Analyzed

12/10/14 16:06

Dil Fac

Spike	LCS	LCS				%Rec.
Added	Result	Qualifier	Unit	D	%Rec	Limits
2.00	2.16	-	ppb v/v		108	70 - 130
2.00	2.60		ppb v/v		130	70 - 130
2.00	2.63	*	ppb v/v		131	70 - 130
2.00	2.31		ppb v/v		115	70 - 130
2.00	2.40		ppb v/v		120	70 - 130
2.00	2.66	*	ppb v/v		133	70 - 130
	2.00 2.00 2.00 2.00 2.00	Added Result 2.00 2.16 2.00 2.60 2.00 2.63 2.00 2.31 2.00 2.40	Added Result Qualifier 2.00 2.16 2.00 2.60 2.00 2.63 2.00 2.31 2.00 2.40	Added Result Qualifier Unit 2.00 2.16 ppb v/v 2.00 2.60 ppb v/v 2.00 2.63 * ppb v/v 2.00 2.31 ppb v/v 2.00 2.40 ppb v/v	Added Result Qualifier Unit D 2.00 2.16 ppb v/v 2.00 2.60 ppb v/v 2.00 2.63 * ppb v/v 2.00 2.31 ppb v/v 2.00 2.40 ppb v/v	Added Result 2.00 Qualifier 2.16 Unit ppb v/v D 90 %Rec 108 2.00 2.60 ppb v/v 130 2.00 2.63 * ppb v/v 131 2.00 2.31 ppb v/v 115 2.00 2.40 ppb v/v 120

Limits

60 - 140

%Recovery Qualifier

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QC Sample Results

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Client Sample ID: Lab Control Sample Prep Type: Total/NA

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2031/1002
Matrix: Air
Analysis Patch: 2024

Analysis Batch: 2031	Spike	LCS	LCS				%Rec.	
Analyte	Added		Qualifier	Unit	D	%Rec	Limits	
1,2,4-Trichlorobenzene	2.00	1.51		ppb v/v	_ <u>-</u>	75	60 - 140	
1,2,4-Trimethylbenzene	2.00	2.27		ppb v/v		113	70 _ 130	
1,2-Dichloro-1,1,2,2-tetrafluoroet	2.00	2.05		ppb v/v		102	60 - 140	
hane								
1,2-Dichlorobenzene	2.00	1.92		ppb v/v		96	70 - 130	
1,2-Dichloroethane	2.00	2.18		ppb v/v		109	70 - 130	
1,2-Dichloropropane	2.00	2.45		ppb v/v		123	70 - 130	
1,3,5-Trimethylbenzene	2.00	2.27		ppb v/v		114	70 - 130	
1,3-Dichlorobenzene	2.00	1.98		ppb v/v		99	70 - 130	
1,4-Dichlorobenzene	2.00	1.99		ppb v/v		99	70 - 130	
Benzene	2.00	2.43		ppb v/v		121	70 - 130	
Benzyl chloride	2.00	2.16		ppb v/v		108	70 - 130	
Bromomethane	2.00	2.03		ppb v/v		101	70 - 130	
Carbon tetrachloride	2.00	2.48		ppb v/v		124	70 - 130	
Chlorobenzene	2.00	2.04		ppb v/v		102	70 - 130	
Chloroethane	2.00	2.29		ppb v/v		115	70 - 130	
Chloroform	2.00	2.23		ppb v/v		112	70 - 130	
Chloromethane	2.00	2.74		ppb v/v		137	60 - 140	
cis-1,2-Dichloroethene	2.00	2.41		ppb v/v		120	70 - 130	
cis-1,3-Dichloropropene	2.00	2.20		ppb v/v		110	70 _ 130	
Dichlorodifluoromethane	2.00	2.26		ppb v/v		113	60 - 140	
Ethylbenzene	2.00	2.24		ppb v/v		112	70 - 130	
1,2-Dibromoethane (EDB)	2.00	2.24		ppb v/v		112	70 - 130	
Hexachlorobutadiene	2.00	2.30		ppb v/v		115	60 - 140	
Methylene Chloride	2.00	2.57		ppb v/v		129	70 - 130	
m-Xylene & p-Xylene	4.00	4.35		ppb v/v		109	70 - 130	
o-Xylene	2.00	2.24		ppb v/v		112	70 - 130	
Styrene	2.00	2.32		ppb v/v		116	70 - 130	
Tetrachloroethene	2.00	2.08		ppb v/v		104	70 - 130	
Toluene	2.00	2.36		ppb v/v		118	70 - 130	
trans-1,3-Dichloropropene	2.00	2.14		ppb v/v		107	70 - 130	
Trichloroethene	2.00	2.09		ppb v/v		105	70 - 130	
Trichlorofluoromethane	2.00	2.28		ppb v/v		114	60 - 140	
Vinyl chloride	2.00	2.56		ppb v/v		128	70 - 130	
viriyi Gilloride	Spike		LCS	ppb v/v		120	%Rec.	
Analyte	Added		Qualifier	Unit	D	%Rec	Limits	
1,1,1-Trichloroethane		11.8	Quanner	ug/m3		108	70 ₋ 130	
1,1,2,2-Tetrachloroethane	14	17.9		ug/m3		130	70 - 130 70 - 130	
		20.2	*	_			70 - 130 70 - 130	
1,1,2-Trichloro-1,2,2-trifluoroetha	15	20.2		ug/m3		131	70 - 130	
ne 1,1,2-Trichloroethane	11	12.6		ug/m3		115	70 - 130	
1,1-Dichloroethane	8.1	9.70		ug/m3		120	70 - 130	
1,1-Dichloroethene	7.9	10.6	*	ug/m3		133	70 - 130	
1,2,4-Trichlorobenzene	15	11.2		ug/m3		75	60 - 140	
1,2,4-Trimethylbenzene	9.8	11.2		ug/m3		113	70 - 130	
1,2-Dichloro-1,1,2,2-tetrafluoroet	14	14.3		ug/m3		102	60 - 140	
hane	17	17.5		ug/IIIO		102	00 - 170	
1,2-Dichlorobenzene	12	11.5		ug/m3		96	70 - 130	
1,2-Dichloroethane	8.1	8.83		ug/m3		109	70 - 130	

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Method: TO-15 - Volatile Organic Compounds in Ambient Air (Continued)

Lab Sample ID: LCS 140-2031/1002

Matrix: Air

Analysis Batch: 2031

Client Sample ID: Lab Control Sample Prep Type: Total/NA

	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
1,2-Dichloropropane	9.2	11.3		ug/m3		123	70 - 130
1,3,5-Trimethylbenzene	9.8	11.2		ug/m3		114	70 _ 130
1,3-Dichlorobenzene	12	11.9		ug/m3		99	70 _ 130
1,4-Dichlorobenzene	12	11.9		ug/m3		99	70 - 130
Benzene	6.4	7.76		ug/m3		121	70 ₋ 130
Benzyl chloride	10	11.2		ug/m3		108	70 - 130
Bromomethane	7.8	7.88		ug/m3		101	70 ₋ 130
Carbon tetrachloride	13	15.6		ug/m3		124	70 - 130
Chlorobenzene	9.2	9.41		ug/m3		102	70 - 130
Chloroethane	5.3	6.05		ug/m3		115	70 ₋ 130
Chloroform	9.8	10.9		ug/m3		112	70 - 130
Chloromethane	4.1	5.67		ug/m3		137	60 - 140
cis-1,2-Dichloroethene	7.9	9.55		ug/m3		120	70 ₋ 130
cis-1,3-Dichloropropene	9.1	9.96		ug/m3		110	70 ₋ 130
Dichlorodifluoromethane	9.9	11.2		ug/m3		113	60 - 140
Ethylbenzene	8.7	9.73		ug/m3		112	70 - 130
1,2-Dibromoethane (EDB)	15	17.2		ug/m3		112	70 ₋ 130
Hexachlorobutadiene	21	24.6		ug/m3		115	60 _ 140
Methylene Chloride	7.0	8.94		ug/m3		129	70 - 130
m-Xylene & p-Xylene	17	18.9		ug/m3		109	70 ₋ 130
o-Xylene	8.7	9.73		ug/m3		112	70 - 130
Styrene	8.5	9.87		ug/m3		116	70 ₋ 130
Tetrachloroethene	14	14.1		ug/m3		104	70 ₋ 130
Toluene	7.5	8.89		ug/m3		118	70 ₋ 130
trans-1,3-Dichloropropene	9.1	9.71		ug/m3		107	70 - 130
Trichloroethene	11	11.3		ug/m3		105	70 - 130
Trichlorofluoromethane	11	12.8		ug/m3		114	60 - 140
Vinyl chloride	5.1	6.54		ug/m3		128	70 _ 130
LCS L	cs						

Surrogate %Recovery Qualifier Limits
4-Bromofluorobenzene (Surr) 106 60 - 140

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QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill

TestAmerica Job ID: 140-2440-1

Air - GC/MS VOA

Analysis Batch: 2031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-2440-1	WAA-01-SU-PS-20141204	Total/NA	Air	TO-15	
140-2440-2	WAA-02-SU-PS-20141204	Total/NA	Air	TO-15	
140-2440-3	WAA-03-SU-PS-20141204	Total/NA	Air	TO-15	
140-2440-4	WAA-04-SU-PS-20141204	Total/NA	Air	TO-15	
140-2440-5	WAA-05-SU-PS-20141204	Total/NA	Air	TO-15	
140-2440-6	WAA-04-SU-DU-20141204	Total/NA	Air	TO-15	
140-2440-7	WAA-00-SU-TB-20141204	Total/NA	Air	TO-15	
LCS 140-2031/1002	Lab Control Sample	Total/NA	Air	TO-15	
MB 140-2031/4	Method Blank	Total/NA	Air	TO-15	

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Client Sample ID: WAA-01-SU-PS-20141204

Lab Sample ID: 140-2440-1

Date Collected: 12/04/14 15:46 Date Received: 12/09/14 10:15

Matrix: Air

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	200 mL	500 mL	2031	12/10/14 21:01	HMT	TAL KNX
	Instrume	nt ID: MG								

Client Sample ID: WAA-02-SU-PS-20141204

Lab Sample ID: 140-2440-2

Date Collected: 12/04/14 14:27 Date Received: 12/09/14 10:15 Matrix: Air

Batch Dil Initial Final Batch **Batch** Prepared Prep Type Туре Method Factor Amount Amount Number or Analyzed Analyst 12/10/14 22:26 Total/NA TO-15 200 mL 500 mL 2031 HMT TAL KNX Analysis Instrument ID: MG

Client Sample ID: WAA-03-SU-PS-20141204

Lab Sample ID: 140-2440-3

Matrix: Air

Date Collected: 12/04/14 15:02 Date Received: 12/09/14 10:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type Total/NA	Type Analysis	Method TO-15	Run	Factor 1	Amount 200 mL	Amount 500 mL	Number 2031	or Analyzed 12/10/14 23:09	Analyst HMT	- Lab TAL KNX
	Instrum	ent ID: MG								

Client Sample ID: WAA-04-SU-PS-20141204

Lab Sample ID: 140-2440-4

Date Collected: 12/04/14 15:20

Matrix: Air

Date Received: 12/09/14 10:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1.48	296 mL	500 mL	2031	12/10/14 23:53	HMT	TAL KNX
	Instrume	ent ID: MG								

Client Sample ID: WAA-05-SU-PS-20141204

Lab Sample ID: 140-2440-5

Date Collected: 12/04/14 14:45 Date Received: 12/09/14 10:15 Matrix: Air

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	200 mL	500 mL	2031	12/11/14 00:35	HMT	TAL KNX
	Instrume	ent ID: MG								

Client Sample ID: WAA-04-SU-DU-20141204

Lab Sample ID: 140-2440-6

Date Collected: 12/04/14 15:20 Date Received: 12/09/14 10:15

Matrix: Air

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	TO-15		1	200 mL	500 mL	2031	12/11/14 01:17	HMT	TAL KNX
	Instrum	ent ID: MG								

Lab Chronicle

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Lab Sample ID: 140-2440-7

Matrix: Air

Date Collected: 12/04/14 16:45 Date Received: 12/09/14 10:15

Client Sample ID: WAA-00-SU-TB-20141204

		Batch	Batch		Dil	Initial	Final	Batch	Prepared		
	Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
	Total/NA	Analysis	TO-15		1	200 mL	500 mL	2031	12/11/14 02:01	HMT	TAL KNX
Instrument ID: MG											

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Certification Summary

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

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Laboratory: TestAmerica Knoxville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date	
	AFCEE		N/A		
Arkansas DEQ	State Program	6	88-0688	06-17-15	
California	State Program	9	2423	06-30-16	
Colorado	State Program	8	N/A	02-28-15	
Connecticut	State Program	1	PH-0223	09-30-15	
Florida	NELAP	4	E87177	06-30-15	
Georgia	State Program	4	906	04-13-17	
Hawaii	State Program	9	N/A	04-13-15	
Kansas	NELAP	7	E-10349	01-31-15	
Kentucky (DW)	State Program	4	90101	12-31-14	
L-A-B	DoD ELAP		L2311	02-13-16	
Louisiana	NELAP	6	LA110001	12-31-15	
Maryland	State Program	3	277	03-31-15	
Michigan	State Program	5	9933	04-13-17	
Nevada	State Program	9	TN00009	07-31-15	
New Jersey	NELAP	2	TN001	06-30-15	
New York	NELAP	2	10781	03-31-15	
North Carolina (DW)	State Program	4	21705	07-31-15	
Ohio VAP	State Program	5	CL0059	03-26-15	
Oklahoma	State Program	6	9415	08-31-15	
Pennsylvania	NELAP	3	68-00576	12-31-14	
South Carolina	State Program	4	84001	06-30-15	
Tennessee	State Program	4	2014	04-13-17	
Texas	NELAP	6	T104704380-TX	08-31-15	
USDA	Federal		P330-13-00260	08-29-16	
Utah	NELAP	8	QUAN3	07-31-15	
Virginia	NELAP	3	460176	09-14-15	
Virginia	State Program	3	165	06-30-15	
Washington	State Program	10	C593	01-19-15	
West Virginia (DW)	State Program	3	9955C	12-31-14	
West Virginia DEP	State Program	3	345	04-30-15	
Wisconsin	State Program	5	998044300	08-31-15	

Method Summary

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Method	nod Method Description		Laboratory
TO-15	Volatile Organic Compounds in Ambient Air	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = TestAmerica Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

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Sample Summary

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill TestAmerica Job ID: 140-2440-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-2440-1	WAA-01-SU-PS-20141204	Air	12/04/14 15:46	12/09/14 10:15
140-2440-2	WAA-02-SU-PS-20141204	Air	12/04/14 14:27	12/09/14 10:15
140-2440-3	WAA-03-SU-PS-20141204	Air	12/04/14 15:02	12/09/14 10:15
140-2440-4	WAA-04-SU-PS-20141204	Air	12/04/14 15:20	12/09/14 10:15
140-2440-5	WAA-05-SU-PS-20141204	Air	12/04/14 14:45	12/09/14 10:15
140-2440-6	WAA-04-SU-DU-20141204	Air	12/04/14 15:20	12/09/14 10:15
140-2440-7	WAA-00-SU-TB-20141204	Air	12/04/14 16:45	12/09/14 10:15

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Canister Samples Chain of Custody Record

5815 Middlebrook Pike

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Knoxville, TN 37921

phone 865,291,3000 fax 865,584,4315

TestAmerica I aboratories Inc

print decize reduce tax decizes. And						i estamerica Laporat										s, mc.						
Client Contact Information			ave Kinrot	h		Samples Collected By: Dave Kinroth										COC No:						
Company Name: Tetra Tech Inc.	Phone: 3	14-517-679	8													of COCs						
Address: 415 Oak Street	Email: en	nily.fisher(@tetratech	.com		-			Π	Т				Т	類的							
City/State/Zip: Kansas City, MO 64106		,				ŀ				- 1			-	=						(-	For Lab Use Only:	
Phone: 816-412-1755	Site Conta	act: Dave	Kinroth - 3	14-517-678	7					İ				section)						ctio	Walk-in Client:	
FAX: 816-410-1748	TA Contac	ct: Emily I	Fisher/Rob	Monnig		1		Įξ					1	88	100	l	l	1		98 9	Lab Sampling:	
Project Name: West Lake Landfill		Anavis	is Turnaro	and Time		1		Low / SIM)				8		in notes						notes		
Site/Location: Bridgeton, MO	Standa	rd (Specific		10 days_		1.		Š				2		Ē					, 1	므	Job / SDG No.:	
P O # 1105352	_	sh (Specifi		,-		1		I ~				8		-						specify	(See below for Add'l Items	
Sample identification	Sample Date(s)	Time Start	Time Stop	Canister Vacuum in Field, 'Hg (Start)'	Canister Vacuum in Field, 'Hg (Stop)'	Flow Controller ID	Canister ID	TO-15 (Med / Std	ма-арн	EPA 3C	EPA 25C / 25.3	ASTM D-1946 / 1945 / 3588 EDA 15/16	TO-3	Other (Please specify	Sample Type	Indoor Air	Ambient Air	Soil Gas	Landfill Gas	Other (Please spe	Sample Specific Notes:	
WAA-01-SU-PS-20141204	12/3/14 - 12/4/14	16:37	15:46	-28.7	-3.0	09950	09879	х									X					
WAA-02-SU-PS-20141204	12/3/14 - 12/4/14	15:42	14:27	-28.7	-5,5	09849	10475	×									х					
WAA-03-SU-PS-20141204	12/3/14 - 12/4/14	16:18	15:02	-28.6	-3.0	09752	10273	х									Х					
WAA-04-SU-PS-20141204	12/3/14 - 12/4/14	16:30	15:20	-28.9	-9.0	09864	10486	х									Х					
WAA-05-SU-PS-20141204	12/3/14 - 12/4/14	16:01	14:45	-28.9	-1.5	09857	10568	×			\perp						Х	·				
WAA-04-SU-DU-20141204	12/3/14 - 12/4/14	16:30	15:20	-28.8	-4.0	11049	34000133	X									Х					
WAA-00-SU-TB-20141204	12/3/14 - 12/4/14	15:42	16:45	-28.7	-28.7	09853	11080	х									Х					
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Samples Relinquished by:	imples Relinquished by: Date / Time: 12-8-14/605					Deseived b	g. ()				2.	G.	i	1 /	/;/	· /)	<u></u>		-		. e e e e e e e e e e e e e e e e e e e	
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Lab Use Only: Shipper Name:		Opened b		119	<u>v)</u>	Condition:	<u> </u>		1000	<u> </u>	<u>/ †</u>	<u> </u>	<u>1</u>		647.40		<u> </u>	د	17.5%			efijal Karl
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12/17/2014

















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Job Number: 140-2440-1

Client: Tetra Tech EM Inc.

Login Number: 2440 List Source: TestAmerica Knoxville

List Number: 1

Creator: Dameron, Bryan K

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td></td>	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	N/A	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	N/A	CHECKED IN LAB
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	N/A	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

TestAmerica Knoxville

TestAmerica Knoxville - Air Canister Initial Pressure Check

Gauge ID: G1

					Pressure @ Receipt		
Analyst	Date	Sample ID	6 L	1 L	(-in Hg or +psig)	Time	Comments
HMT	12/10/2014		X		0.0	11:00	Comments
HMT		140-2440-A-2	Х		-1.5	11:01	
HMT		140-2440-A-3			0.0	11:02	
HMT		140-2440-A-4	х		-8.1	11:03	
HMT		140-2440-A-5			0.0	11:04	
HMT		140-2440-A-6			-1.8	11:05	
HMT	12/10/2014		X		-27.9	11:06	TB pressed up to 4.2
111411	12/10/2011	110 2110 7()			27.5	11.00	12 pressed up to 1.2
	L		<u> </u>				ı

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri				
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)				
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)				
Review Date	February 25, 2015				
Sample Delivery Group (SDG):	J9958				
Sample Numbers: WAA-01-AF-PS-20141217, WAA-02-AF-PS-20141217, WAA-05-AF-20141217, WAA-04-AF-PS-20141217, WAA-05-AF-20141217, and WAA-00-AF-FB-20141217					
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank				
Methods Data Review" (9240.1-48). Packages from Subcontracted Labor Agency Radiological Laboratory A criteria specified in the applicable of the review was intended to identify apparent from the summary data pathat were found, and data qualificat limited to the available field and lab package. I, Harry Ellis, certify that all data value.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were				
assessed, and any quantications ma	de to the data accorded with those documents. 25 February 2015				
Certified by Harry Ellis, Chemist	Date				

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J9958 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank and the field yielded low activities for one (of three) thorium isotopes and for one (of three) uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J"). In two samples, the actual minimum detectable activity for total radium was greater than the reporting limit, due to the small sample size.

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-9958-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

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Authorized for release by: 1/20/2015 10:38:28 AM

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

..... Links

Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-9958-1

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Method Summary	8
Sample Summary	9
Client Sample Results	10
QC Sample Results	14
QC Association Summary	17
Tracer Carrier Summary	18

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Job ID: 160-9958-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-9958-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 12/22/2014 11:40 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 20.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20141217 (160-9958-1), WAA-02-AF-PS-20141217 (160-9958-2), WAA-03-AF-PS-20141217 (160-9958-3), WAA-04-AF-PS-20141217 (160-9958-4), WAA-05-AF-PS-20141217 (160-9958-5) and WAA-00-AF-FB-20141217 (160-9958-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 01/06/2015 and analyzed on 01/07/2015.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

The total alpha emitting radium isotopes detection goal was not met for the following samples due to the reduced sample volume; the samples are filters that were split among other analyses: WAA-04-AF-PS-20141217 (160-9958-4), WAA-05-AF-PS-20141217

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Job ID: 160-9958-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

(160-9958-5). The data have been qualified and reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141217 (160-9958-1), WAA-02-AF-PS-20141217 (160-9958-2), WAA-03-AF-PS-20141217 (160-9958-3), WAA-04-AF-PS-20141217 (160-9958-4), WAA-05-AF-PS-20141217 (160-9958-5) and WAA-00-AF-FB-20141217 (160-9958-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/05/2015 and analyzed on 01/09/2015.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141217 (160-9958-1), WAA-02-AF-PS-20141217 (160-9958-2), WAA-03-AF-PS-20141217 (160-9958-3), WAA-04-AF-PS-20141217 (160-9958-4), WAA-05-AF-PS-20141217 (160-9958-5) and WAA-00-AF-FB-20141217 (160-9958-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/05/2015 and analyzed on 01/08/2015.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record



Earth City, MO 63045																				THE LEADER IN ENVIRONME	NTAL TESTING
phone 314.298,8566 fax	Regu	latory Pro	gram: [DW [NPDES		RCR	A		Other:										TestAmerica Labora	itories, Inc.
Client Contact	Project N	lanager: D	ave Kinro	th		Site	Con	tact:	: Da	ave Ki	nroth		Date: 12-22-14							COC No:	
Tetra Tech, Inc.	Tel/Fax:	314-517-67	7-6798 Lab Contact: Mike Franks						Carrier: NA						-	1 of 1	COCs				
415 Oak Street		Analysis T	urnaround	Time		П	T				1: 1		T		1		T	T	1	Sampler:	
Kansas City, MO 64106	CALEN	DAR DAYS	☑ WOR	KING DAY	S														ſ	For Lab Use Only:	
(816) 412-1786 Phone	TAT	if different fro	m Below	_20	_	2					0	1 1					.		ļ	Walk-in Client:	
(816) 816-410-1748 FAX		2	weeks			2 >	g		Ē	Ę Ę	[[[İ	Lab Sampling:	
Project Name: West Lake Landfill Site		1	week			ء ح	/Be	Spec	Rad	ori(ani	9)	1 1		- 1						' ` <u>L</u>	
Site: Bridgeton, MO		2	days			S S	g	ε	ha	FO				ł				-	-	Job / SDG No.:	
PO# 1105610		.1	day			a a	s A	Gamm	₽	topi	į										
			Sample Type			Filtered Sample (Y/N)	9310 Gross Alpha/Beta	유	9315 Total Alpha Radium	A-01-R Isotopic Thorium A-01-R Isotopic Uranium	9315 Radium-226 (GFPC)			-							
	Sample	Sample	(C=Comp,		# of	i e	ě	GÀ-01-R (151	7 2	315						-				
Sample Identification	Date	Time	G=Grab)	Matrix	Cont.	E	8	ð	8	4 4	(S)									Sample Specific N	lotes:
WAA-01-AF-PS-20141217	12/17/14	15:10	Filter	Air	1		Х	х	х	x x	(x									* 9315 Radium-226 (GFF	°C)
WAA-02-AF-PS-20141217	12/17/14	15:18	Filter	Air	1	Ш	Х	х	Х	ХX	(x									contingent upon TAR res	ults
WAA-03-AF-PS-20141217	12/17/14	15:53	Filter	Air	1		Х	х	Х	хх	(x								T	for all samples	
WAA-04-AF-PS-20141217	12/17/14	16:09	Filter	Air	1		х	х	Х	хх	(x										
WAA-05-AF-PS-20141217	12/17/14	15:40	Filter	Air	1		X	х	Х	хх	(x										
WAA-00-AF-FB-20141217	12/17/14	NA	Filter	Air	1		Х	х	Х	x x	(x			T	T						
																			1		
5																	1	1	1		
						П									T						
						П															
						П					11				T	160-	9958	B Cha	ain of	Custody	
						П							1	\top	Ť	.00	000	5 5116			
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=	=NaOH; 6=	Other																			
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please I Comments Section if the lab is to dispose of the sample.	list any EP	A Waste Co	odes for the	sample	in the	s	amp	le Di	ispo	sal (A fee	may be	ass	esse	d if s	ampl	es a	re re	taine	ed longer than 1 month)	
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant	Poison	В	Unkno	own		1	□R	tetum	to C	lient		Dis	posal	by Lab	:		□Ar	chive f	for	Months	
Special Instructions/QC Requirements & Comments:									-					_						····	
					•												,				
•																•					
Custody Seals Intact: Yes No	Custody S	eal No.:							Coc	oler Te	mp. (C): Obs	d:		C	orr'd:			ī	herm ID No.:	
Relinquished by:	Company			Date/Ti	me:	R	eceiv	_			• ` `		_	C	ompa					Date/Time:	
Relinquished by:	Company:			Date/Ti	me.	- I	eceix	red h	ον.		· · · · · · · · · · · · · · · · · · ·			-	mno	n\r				Date/Time:	
B Thing & Barba			M	12/22/	/14 11	40		20	1	Cl	ar	<u></u>			ompa A5					1222-14 1144)
Relinquished by: U	Company:			Date/Ti	me:	R	ecér	ed in	n La	borato	ory by	-		Co	ompa	ny:				Date/Time:	
11	1			ı		E								1						l	,

Client: Tetra Tech EM Inc. Jo

Job Number: 160-9958-1

Login Number: 9958 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

ordator. Olaric, olir o		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

TestAmerica Job ID: 160-9958-1 Project/Site: West Lake Landfill - Filters

Qualifiers

Rad

PQL

QC

RER

RPD

TEF

TEQ

RL

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin) Toxicity Equivalent Quotient (Dioxin)

Reporting Limit or Requested Limit (Radiochemistry)

Relative Percent Difference, a measure of the relative difference between two points

Quality Control

Relative error ratio

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.
G	The Sample MDC is greater than the requested RL.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-9958-1	WAA-01-AF-PS-20141217	Filter	12/17/14 15:10	12/22/14 11:40
160-9958-2	WAA-02-AF-PS-20141217	Filter	12/17/14 15:18	12/22/14 11:40
160-9958-3	WAA-03-AF-PS-20141217	Filter	12/17/14 15:53	12/22/14 11:40
160-9958-4	WAA-04-AF-PS-20141217	Filter	12/17/14 16:09	12/22/14 11:40
160-9958-5	WAA-05-AF-PS-20141217	Filter	12/17/14 15:40	12/22/14 11:40
160-9958-6	WAA-00-AF-FB-20141217	Filter	12/17/14 00:00	12/22/14 11:40

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Client: Tetra Tech EM Inc.

Thorium-228

Thorium-230

Thorium-232

0.167

0.322

0 0685

3

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Client Sample ID: WAA-01-AF-PS-20141217 Lab Sample ID: 160-9958-1 Date Collected: 12/17/14 15:10 Matrix: Filter Date Received: 12/22/14 11:40 Method: 9315 - Total Apha Radium (GFPC) Count Total Uncert. UncerL Result Qualifler Analyte $(2\sigma + l -)$ (20 + l -)RL. MDC Unit Prepared Analyzed Dil Fac Total Alpha Radium 0.0356 0.533 1,00 01/06/15 13:24 0.533 1.00 pCi/Sample 01/07/15 20:21 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carner 96.8 40 - 110 01/06/15 13:24 01/07/15 20 21 Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Total Uncert. lincert Analyte Result Qualifier $(2\sigma + l -)$ $(2\sigma + l -)$ RL MDC Unit Prepared Analyzed Dil Fac 0.120 1.00 Thorium-228 0.106 0.107 0.168 pCi/Sample 01/05/15 13:13 01/09/15 11:36 Thorium-230 0.464 0.125 0.131 1.00 0.0759 pCi/Sample 01/05/15 13 13 01/09/15 11:36 Thorium-232 0.0237 0.0417 0.0418 (1.00) 0.0756 pCi/Sample 01/05/15 13:13 01/09/15 11 36 1 Tracer %Yield Qualifier Limits Prepared Analyzed Dii Fac Thonum-229 93.1 30 - 110 01/05/15 13:13 01/09/15 11.38 1 Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) Count Total Uncert. Uncert. Result Qualifier RL Analyte $(2\sigma + l -)$ (20+/-) MDC Unit Prepared Analyzed Dil Fac 0.0909 0.0525 0,0531 1.00 0.0227 pCi/Sample 01/05/15 13:13 01/08/15 12:35 Uranium-233/234 0.0462 0.0462 0.0903 pCi/Sample Uranium-235/236 0.0189 (00) 01/05/15 13 13 01/08/15 12 35 1 Uranium-238 0.0983 0.0545 0,0552 1.00 pCi/Sample 01/05/15 13:13 01/08/15 12 35 Tracer %Yield Qualifier Limits Prepared Analyzed Dil Fac Uranium-232 94.4 30 - 110 01/05/15 13:13 01/08/15 12 35 Client Sample ID: WAA-02-AF-PS-20141217 Lab Sample ID: 160-9958-2 Date Collected: 12/17/14 15:18 Matrix: Filter Date Received: 12/22/14 11:40 Method: 9315 - Total Apha Radium (GFPC) Total Count Uncert. Uncert Analyte Result Qualifier (20+/-) $(2\sigma + l-)$ RL MDC Unit Prepared Analyzed Dil Fac 0.0544 W 0.474 0 474 1 00 0.899 pCi/Sample 01/06/15 13:24 01/07/15 20:22 Total Alpha Radium 1 Analyzed Limits Dil Fac Carrier **%Yield Qualifier** Prepared 01/06/15 13:24 Ba Carrier 97.6 40 - 110 01/07/15 20 22 Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) Count Total Uncert Uncert. Result Qualifier (20+/-) $(2\sigma + l - 1)$ RL MDC Unit Prepared Analyzed Dil Fac Analyte

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1.00

1.00

1.00

0.164

0.0888

pCi/Sample

pCi/Sample

0.0928 pCi/Sample

0.113

0.112

0.0631

0.112

0.109

0.0628

TestAmerica St Louis

1

01/09/15 11 36

01/09/15 11 36

01/09/15 11:36

01/05/15 13:13

01/05/15 13 13

01/05/15 13:13

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Lab Sample ID: 160-9958-2

TestAmerica Job ID 160-9958-1

Client Sample ID: WAA-02-AF-PS-20141217

Date Collected: 12/17/14 15:18 Date Received: 12/22/14 11:40 Matrix: Filter

Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thonum-229	91 0		30 - 110					01/05/15 13 13	01/09/15 11 36	1
Method: A-01-R - Is	otopic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0450	W	0.0519	0.0521	1.00	0.0829	pCi/Sample	01/05/15 13 13	01/08/15 12 35	1
Uranium-235/236	0.00933	U	0,0323	0.0323	1.00	0.0714	pCi/Sample	01/05/15 13:13	01/08/15 12 35	1
Uranium-238	0.0823	3	0.0540	0.0544	1.00	0,0573	pCi/Sample	01/05/15 13.13	01/08/15 12 35	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	93,5		30 - 110					01/05/15 13:13	01/08/15 12:35	-

Client Sample ID: WAA-03-AF-PS-20141217

Date Collected: 12/17/14 15:53 Date Received: 12/22/14 11:40

Lab Sample ID: 160-9958-3

Matrix: Filter

Analyte	Result	Qualifier	Count Uncert. (20+/-)	Total Uncert (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium		GI	0,507	0.510	1.00	0.765	pCi/Sample	01/06/15 13:24	01/07/15 20.22	1
Carrier		Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.3		40 - 110					01/06/15 13:24	01/07/15 20 22	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
		,	Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dit Fac
Thorium-228	0.0823	u	0,112	0.112	1.00	0.187	pCi/Sample	01/05/15 13:13	01/09/15 11:36	1
Thorium-230	0.263	7	0.101	0.104	1.00	0.0914	pCl/Sample	01/05/15 13:13	01/09/15 11:36	1
Thorium-232	-0.0246	4	0,0634	0.0635	1.00	0,139	pCi/Sample	01/05/15 13:13	01/09/15 11 36	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.4		30 - 110					01/05/15 13 13	01/09/15 11 36	1
Method: A-01-R - Iso	topic Uraniu	ım (Ainha S	pectrometry)							
		V	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2 0+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.141	7	0.0900	0.0908	1.00	0.125	pCl/Sample	01/05/15 13:13	01/08/15 12 35	1
Uranium-235/236	-0.0184		0.0451	0.0451	1.00	0.113	pCi/Sample	01/05/15 13:13	01/08/15 12 35	1
Uranium-238	0.118	7	0.0661	0.0668	1.00	0 0708	pCi/Sample	01/05/15 13 13	01/08/15 12 35	1
Tracor	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	96 1	-	30-110					01/05/15 13:13	01/08/15 12:35	

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Client Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Client Sample ID: WAA-04-AF-PS-20141217

Date Collected: 12/17/14 16:09 Date Received: 12/22/14 11:40 Lab Sample ID: 160-9958-4

Matrix: Filter

Analyte	Result	Qualifier	Count Uncert (20+/-)	Total Uncert. (2σ+/-)	RL	MĐÇ	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.582	lus:	0.647	0,649	1.00	1.09	pCi/Sample	01/06/15 13:24	01/07/15 20 22	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	400		40 440					04 5045 40.04	04 874 5 00 00	
Da Carrier	100		40 - 110					01/08/15 13:24	01/07/15 20 22	
		ım (Alpha S		2-0				01/06/15 13:24	01/01/15 20 22	
		ım (Alpha S		Total Uncert.				01/00/15 13:24	01/01/15 20 22	1
Method: A-01-R - Iso			pectrometry) Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Method: A-01-R - Iso Analyte	topic Thoriu Result	Qualifier	pectrometry) Count Uncert	Total Uncert.	RL 1.00	MDC 0.155	Unit pCl/Sample			Dil Fac
Method: A-01-R - Iso Analyte Thorium-228 Thorium-230	topic Thoriu	Qualifier	pectrometry) Count Uncert (20+/-)	Total Uncert. (2σ+/-)				Prepared	Analyzed	Dil Fac

Thorium-229 98.9 30 - 110 01/05/15 13 13 01/09/15 11:36

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Count Total
Uncert. Uncert.

			uncerc	uncert						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.000	M	0.0945	0.0945	1.00	0.178	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1
Uranium-235/236	0.000	M	0.0455	0.0455	1.00	0.103	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1
Uranium-238	0.0373	M	0.0830	0.0831	1.00	0.147	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	94.5		30 - 110					01/05/15 13:13	01/08/15 12 35	1

Client Sample ID: WAA-05-AF-PS-20141217

%Yield Qualifier

Limits

Date Collected: 12/17/14 15:40 Date Received: 12/22/14 11:40

Tracer

Lab Sample ID: 160-9958-5

Analyzed

Prepared

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tolal Alpha Radium	0.298	ay.	0.613	0 614	1.00	1.07	pCi/Sample	01/06/15 13 24	01/07/15 20 22	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98 2	1	40 - 110					01/06/15 13 24	01/07/15 20:22	1
Analyte	Result	Qualifier	Uncerl. (20+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0733	W _	0,112	0 112	(1.00)	0.189	pCi/Sample	01/05/15 13 13	01/09/15 11:36	1
Thorium-230	0.350	,)	0.112	0,115	1.00	0.0780	pCi/Sample	01/05/15 13.13	01/09/15 11 36	1
Thorium-232	0.0405	en	0.0486	0 0487	1.00	0.0776	pC /Sample	01/05/15 13 13	01/09/15 11 36	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dit Fac
Thorium-229	86 5		30 - 110		201	211		01/05/15 13 13	01/09/15 11 36	1
			11 1		1	-01/1				

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TestAmerica St. Louis 1/20/2015

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID. 160-9958-1

Lab Sample ID: 160-9958-5 Client Sample ID: WAA-05-AF-PS-20141217

Date Collected: 12/17/14 15:40 Date Received: 12/22/14 11:40

Matrix: Filter

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dii Fac
Uranium-233/234	0.110	3	0.0706	0.0712	1.00	0.0873	pCi/Sample	01/05/15 13:13	01/08/15 12 37	1
Uranium-235/236	-0.0196	y	0.0393	0.0393	1.00	0.109	pCi/Sample	01/05/15 13 13	01/08/15 12 37	1
Uranium-238	0.0630	we.	0.0546	0.0548	1.00	0.0754	pCi/Sample	01/05/15 13:13	01/08/15 12:37	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	92.6		30 - 110					01/05/15 13 13	01/08/15 12:37	1

Client Sample ID: WAA-00-AF-FB-20141217

Date Collected: 12/17/14 00:00 Date Received: 12/22/14 11:40

Lab Sample ID: 160-9958-6 Matrix, Filter

Method: 9315 - Total	Apha Radio	ım (GFPC)								
		,	Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(2 <i>σ+l-</i>)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.585	U	0.598	0.601	1.00	0.982	pCi/Sample	01/06/15 13:24	01/07/15 20:32	1

Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac 40 - 110 01/06/15 13.24 01/07/15 20 32 Ba Carrier 102

Method: A-01-R - I	sotopic Thoriu	ım (Alpha S	pectrometry)	+						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0 124	6	0.108	0.109	1.00	0.170	pCi/Sample	01/05/15 13 13	01/09/15 11 36	1
Thorium-230	0.363	7	0.107	0.111	1.00	0.0701	pCi/Sample	01/05/15 13:13	01/09/15 11:36	1
Thorium-232	0 0470	on	0.0424	0.0425	1.00	0.0557	pCi/Sample	01/05/15 13 13	01/09/15 11:36	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-220	101		30 110					01/05/15 13 13	01/09/15 11 36	1

Thorium-232	0.0470	on	0.0424	0.0425	1.00	0.0557	pCi/Sample	01/05/15 13 13	01/09/15 11:35	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	101		30 . 110					01/05/15 13 13	01/09/15 11 36	1
Method: A-01-R - is		ım (Aloha S								

			Count	(QLAI						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.113	3	0.0759	0.0765	1.00	0.0996	pCi/Sample	01/05/15 13 13	01/08/15 12 37	1
Uranium-235/236	0.0101	W	0.0349	0.0349	1.00	0.0771	pCi/Sample	01/05/16 13 13	01/08/15 12:37	1
Uranium-238	0.0646	14	0 0646	0.0649	1.00	0,0994	pCi/Sample	01/05/15 13 13	01/08/15 12:37	1
Tracer	%Yleid	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Heanium 232	88 3		30 110					01/05/15 13 13	01/08/15 12:37	7

H VG 25 Feb 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-166845/1-A

Matrix: Filter

Analysis Batch: 167353

Client Sample ID: Method Blank

Prep Batch: 166845

Prep Type: Total/NA

МВ MB Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared Dil Fac Analyzed -0.01820 Ū 0.509 0.509 1.00 0.979 pCi/Sample 01/06/15 13:24 Total Alpha Radium 01/07/15 20:21

Total

Count

MΒ MB

Carrier %Yield Qualifier I imits Ba Carrier 92.0 40 - 110

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166845

Lab Sample ID: LCS 160-166845/2-A **Matrix: Filter**

Analysis Batch: 167353

Total

Uncert.

4 21

MDC Unit

RL

1.00

RL

1.00

%Rec 0.990 pCi/Samp 81

Prepared

01/06/15 13:24

%Rec. Limits

65 - 150

Analyzed

01/07/15 20:21

Dil Fac

LCS LCS Spike Analyte Added Result Qual $(2\sigma + / -)$

45.0

Limits

40 - 110

Spike

Added

45.0

36 31

LCSD LCSD

Qual

Result

40.65

Total Alpha Radium

LCS LCS

%Yield Qualifier Carrier Ba Carrier 92.3

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 166845

Lab Sample ID: LCSD 160-166845/3-A

Matrix: Filter

Analysis Batch: 167353

Total

 $(2\sigma + / -)$

4.61

Uncert.

MDC Unit

0.857

pCi/Samp

%Rec. %Rec

90

RER

Limits RER Limit

Total Alpha Radium

Analyte

LCSD LCSD

Carrier %Yield Qualifier Limits Ba Carrier 92.3 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-166622/1-A

Matrix: Filter

Analysis Batch: 167566

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166622

Count Total мв мв Uncert. Uncert. Result Qualifier Analyte $(2\sigma + / -)$ $(2\sigma + / -)$ RL MDC Unit Prepared Analyzed Dil Fac Thorium-228 0.1075 Ū 0.113 0.114 1.00 0.184 pCi/Sample 01/05/15 13:13 01/09/15 11:36 Thorium-230 0.4535 0.133 0.139 1.00 0.111 pCi/Sample 01/05/15 13:13 01/09/15 11:36 Thorium-232 0.008919 U 0.0371 0.0371 1.00 0.0789 pCi/Sample 01/05/15 13:13 01/09/15 11:36

> MB MB

Tracer %Yield Qualifier Limits Prepared Analyzed Dil Fac 01/05/15 13:13 Thorium-229 86.2 30 - 110 01/09/15 11:36

TestAmerica St. Louis

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-166622/2-A

Matrix: Filter

Analysis Batch: 167567

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166622

Total Spike LCS LCS %Rec. Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 1.00 0.0601 pCi/Samp 16.1 17.07 1.61 106 81 - 118

LCS LCS

 Tracer
 %Yield
 Qualifier
 Limits

 Thorium-229
 93.3
 30 - 110

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 166622

Lab Sample ID: LCSD 160-166622/3-A

Matrix: Filter

Analysis Batch: 167568

Total LCSD LCSD RER Spike Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit Thorium-230 16.1 17.28 1.64 1.00 0.0791 pCi/Samp 108 81 - 118 0.06

LCSD LCSD

 Tracer
 %Yield Thorium-229
 Qualifier Report
 Limits And Limits

 30 - 110
 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-166623/1-A

Matrix: Filter

Analysis Batch: 167424

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 166623

			Count	iotai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.09569		0.0677	0.0681	1.00	0.0882	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1
Uranium-235/236	0.02977	U	0.0525	0.0526	1.00	0.0951	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1
Uranium-238	0.04775	U	0.0637	0.0638	1.00	0.107	pCi/Sample	01/05/15 13:13	01/08/15 12:35	1

MB MB

 Tracer
 %Yield Ualifier
 Limits
 Prepared
 Analyzed
 Dil Fac

 Uranium-232
 87.8
 30 - 110
 01/05/15 13:13
 01/08/15 12:35
 1

Lab Sample ID: LCS 160-166623/2-A

Matrix: Filter

Analysis Batch: 167425

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 166623

			i otai							
Spike	LCS	LCS	Uncert.					%Rec.		
Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
25.5	24.90		2.28	1.00	0.0902	pCi/Samp	98	84 - 120		
26.0	25.85		2.36	1.00	0.0780	pCi/Samp	99	82 - 122		
	Added 25.5	25.5 Result 24.90	Added Result Qual 25.5 24.90	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) 25.5 24.90 2.28	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL 25.5 24.90 2.28 1.00	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC 25.5 24.90 2.28 1.00 0.0902	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit 25.5 24.90 2.28 1.00 0.0902 pCi/Samp	Spike LCS LCS Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec 25.5 24.90 2.28 1.00 0.0902 pCi/Samr 98	Spike LCS LCS Uncert. %Rec. Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits 25.5 24.90 2.28 1.00 0.0902 pCi/Samr 98 84 - 120	Spike LCS LCS Uncert. %Rec. Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits 25.5 24.90 2.28 1.00 0.0902 pCi/Samp 98 84 - 120

LCS LCS

 Tracer
 %Yield Qualifier
 Limits

 Uranium-232
 89.0
 30 - 110

TestAmerica St. Louis

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QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

86.8

TestAmerica Job ID: 160-9958-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

Prep Batch: 166623

Lab Sample ID:	LUSD	160-166623/3-4
Matrix: Filter		

Uranium-232

Analysis Batch: 167426

						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
A	nalyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Ū	ranium-233/23		25.5	25.49		2.33	1.00	0.0248	pCi/Samp	100	84 - 120	0.13	1
4													
U	ranium-238		26.0	25.94		2.37	1.00	0.0791	pCi/Samp	100	82 - 122	0.02	1
	LCS	D LCSD											
7.		ld Qualifier	Limits										

30 - 110

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9958-1

Rad

Prep Batch: 166622

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-9958-1	WAA-01-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-2	WAA-02-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-3	WAA-03-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-4	WAA-04-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-5	WAA-05-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-6	WAA-00-AF-FB-20141217	Total/NA	Filter	ExtChrom	
LCS 160-166622/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-166622/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-166622/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 166623

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-9958-1	WAA-01-AF-PS-20141217	Total/NA	Filter	ExtChrom	_
160-9958-2	WAA-02-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-3	WAA-03-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-4	WAA-04-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-5	WAA-05-AF-PS-20141217	Total/NA	Filter	ExtChrom	
160-9958-6	WAA-00-AF-FB-20141217	Total/NA	Filter	ExtChrom	
LCS 160-166623/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-166623/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-166623/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 166845

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-9958-1	WAA-01-AF-PS-20141217	Total/NA	Filter	DPS-0	_
160-9958-2	WAA-02-AF-PS-20141217 Total/NA		Filter	DPS-0	
160-9958-3	WAA-03-AF-PS-20141217	Total/NA		DPS-0	
160-9958-4	WAA-04-AF-PS-20141217	Total/NA	Filter	DPS-0	
160-9958-5	WAA-05-AF-PS-20141217	Total/NA	Filter	DPS-0	
160-9958-6	WAA-00-AF-FB-20141217	Total/NA	Filter	DPS-0	
LCS 160-166845/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-166845/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-166845/1-A	Method Blank	Total/NA	Filter	DPS-0	

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TestAmerica Job ID: 160-9958-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-9958-1	WAA-01-AF-PS-20141217	96.8	
160-9958-2	WAA-02-AF-PS-20141217	97.6	
160-9958-3	WAA-03-AF-PS-20141217	97.3	
160-9958-4	WAA-04-AF-PS-20141217	100	
160-9958-5	WAA-05-AF-PS-20141217	98.2	
160-9958-6	WAA-00-AF-FB-20141217	102	
LCS 160-166845/2-A	Lab Control Sample	92.3	
LCSD 160-166845/3-A	Lab Control Sample Dup	92.3	
MB 160-166845/1-A	Method Blank	92.0	
Tracer/Carrier Legend			
Ba = Ba Carrier			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-9958-1	WAA-01-AF-PS-20141217	93.1	
160-9958-2	WAA-02-AF-PS-20141217	91.0	
160-9958-3	WAA-03-AF-PS-20141217	91.4	
160-9958-4	WAA-04-AF-PS-20141217	98.9	
160-9958-5	WAA-05-AF-PS-20141217	86.5	
160-9958-6	WAA-00-AF-FB-20141217	101	
LCS 160-166622/2-A	Lab Control Sample	93.3	
LCSD 160-166622/3-A	Lab Control Sample Dup	87.5	
MB 160-166622/1-A	Method Blank	86.2	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
60-9958-1	WAA-01-AF-PS-20141217	94.4	
60-9958-2	WAA-02-AF-PS-20141217	93.5	
160-9958-3	WAA-03-AF-PS-20141217	96.1	
160-9958-4	WAA-04-AF-PS-20141217	94.5	
160-9958-5	WAA-05-AF-PS-20141217	92.6	
60-9958-6	WAA-00-AF-FB-20141217	88.3	
CS 160-166623/2-A	Lab Control Sample	89.0	
CSD 160-166623/3-A	Lab Control Sample Dup	86.8	
MB 160-166623/1-A	Method Blank	87.8	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J9986
Sample Numbers:	WAA-01-AF-PS-20141223, WAA-02-AF-PS-20141223, WAA-03-AF-PS-20141223, WAA-04-AF-PS-20141223, WAA-05-AF-PS-20141223, and WAA-00-AF-FB-20141223
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Interest as a second package of the summary data package.	y problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date
Jerunia of many Dines, Chemine	Dute

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J9986 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low activities for one (of three) thorium isotopes and for one (of three) uranium isotopes, while the field blank yielded similar activities for those two isotopes and one more uranium isotope. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-9986-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Rhonda Ridenhower

Authorized for release by: 1/29/2015 10:29:04 AM Rhonda Ridenhower, Manager of F

Rhonda Ridenhower, Manager of Project Management rhonda.ridenhower@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

·····LINKS ·······

Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-9986-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Job ID: 160-9986-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-9986-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 12/29/2014; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20141223 (160-9986-6), WAA-01-AF-PS-20141223 (160-9986-1), WAA-02-AF-PS-20141223 (160-9986-2), WAA-03-AF-PS-20141223 (160-9986-3), WAA-04-AF-PS-20141223 (160-9986-4), WAA-05-AF-PS-20141223 (160-9986-5). A LCS/LCSD was performed as batch QC

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20141223 (160-9986-1), WAA-02-AF-PS-20141223 (160-9986-2), WAA-03-AF-PS-20141223 (160-9986-3), WAA-04-AF-PS-20141223 (160-9986-4), WAA-05-AF-PS-20141223 (160-9986-5) and WAA-00-AF-FB-20141223 (160-9986-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 01/07/2015 and analyzed on 01/13/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Job ID: 160-9986-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141223 (160-9986-1), WAA-02-AF-PS-20141223 (160-9986-2), WAA-03-AF-PS-20141223 (160-9986-3), WAA-04-AF-PS-20141223 (160-9986-4), WAA-05-AF-PS-20141223 (160-9986-5) and WAA-00-AF-FB-20141223 (160-9986-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/07/2015 and analyzed on 01/09/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141223 (160-9986-1), WAA-02-AF-PS-20141223 (160-9986-2), WAA-03-AF-PS-20141223 (160-9986-3), WAA-04-AF-PS-20141223 (160-9986-4), WAA-05-AF-PS-20141223 (160-9986-5) and WAA-00-AF-FB-20141223 (160-9986-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/07/2015 and analyzed on 01/09/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Earth City, MO 63045

phone 314.298.8566 fax	Regulatory Program: DW NPDES						RCRA Other:					29MOK						TestAmerica Laboratories, Inc.	
Client Contact	Project Manager: Dave Kinroth										inroth		Date: 12-15-14						COC No:
Tetra Tech, Inc.		314-517-67								ke Fr			Carrier: NA						
415 Oak Street	Analysis Turnaround Tir								1		anks	-	Carrie	71. IVA		1 1			
Kansas City, MO 64106	CALEN			KING DAY	s		1			- 1				1 1	- 1				Sampler:
(816) 412-1786 Phone		if different from		20			7					Ì					- 1		For Lab Use Only:
(816) 816-410-1748 FAX			weeks		•	2 2			٤	ء اء	(GFPC)	1	1 1						Walk-in Client:
Project Name: West Lake Landfill Site			week			ISI:	- 1 #g	Spec	흉	륁	9					1 1			Lab Sampling:
Site: Bridgeton, MO			days				ha/	g	a R	토 등	5 8								
PO# 1105610			day	•		흔	₹	l III	힐	읪	ξĘ								Job / SDG No.:
			Sample		-	Sar	SS	වි	a	50 50	蒙	1.							
	Sample	Sample	Туре			9 5	ŏ	1-R	ᅙ	나 선	5 R			1 1					
Sample Identification	Date	Time	(C≔Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	330	GA-01-R Gamm	9315 Total Alpha Radium	A-01-R Isotopic Thorium A-01-R Isotopic Uranium	* 9315 Radium-226		1 1						
				Macia		111111111111	- 6	10	6	<u> </u>	*		 	+					Sample Specific Notes:
WAA-01-AF-PS-20141223	12/23/14	15:38	Filter	Air	1		X	x	х	x x	(x								* 9315 Radium-226 (GFPC)
WAA-02-AF-PS-20141223	12/23/14	14:15	Filter	Air	1	Ш	Х	Х	х	x x	(x								contingent upon TAR results
WAA-03-AF-PS-20141223	12/23/14	14:45	Filter	Air	1	Ш	х	х	х	$\mathbf{x} \mathbf{x}$	$\langle x \rangle$								for all samples
WAA-04-AF-PS-20141223	12/23/14	15:02	Filter	Air	1		Х	Х	х	хх	(x			\prod					
ປ ນ WAA-05-AF-PS-20141223	12/23/14	14:27	Filter	Air	1	П	×	х	х	хx				11		\prod	\top	T	
WAA-00-AF-FB-20141223	12/23/14	NA	Filter	Aír	1	П	X	х	Х		1 1		11	11			+		
off					<u> </u>		Ť		Ĥ	7	11	_	++-	++	+	H			
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														1	0-9986	6 Cha	ain of (Custo	ody
											11			T	. [.]	Ι-Т	1-1	T -1	
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=	NaOH; 6=	Other								40									
Possible Hazard Identification:						s	amp	le D	spo	sal (/	A fee	may b	e asses	ssed it	samo	oles a	are ret	aine	d longer than 1 month)
Are any samples from a listed EPA Hazardous Waste? Please L Comments Section if the lab is to dispose of the sample.	ist any EP	4 Waste Co	des for the	sample	in the										•				
Non-Hazard Flammable Skin Irritant	Poison				***********		_												
	Poison	5	Unknor	νn		L_	LJR	Return	to Cli	ient		p	isposal by	Lab			rchive fo	or	Months
Special Instructions/QC Requirements & Comments:																			
Custody Seals Intact: Yes No	Custody S	eal No.:				-		_	Cool	ler Te	mp_(C): Ob	s'd:		Corr'o	d.		T∤	nerm ID No.:
Religanished by:	Company:			Date/Tir	ne:	.21R	g cejv		Á.	7	$\overline{}$,		Com	pany:	-			Date/Time:
Pelinguished by Janlow	Tetr		, 1	12-29-		4			1	5	1 /		•		52 (C		.	12-29-14/1130
Relinquished by:	Company:		·	Date/Tir		R	eceiv	red f	iy:	7	쌏				pany:				Date/Time:
29						I					-		-		r, .				
Relinquished by:	Company:			Date/Tir	ne:	R	eceiv	red i	n Lal	porato	ory by			Com	pany:				Date/Time:
<u> </u>											- "			1					
									****									1	

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Client: Tetra Tech EM Inc. Job Number: 160-9986-1

Login Number: 9986 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

ordator. Otarito, om o		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-9986-1

Qualifiers

Rad

ND

PQL

QC RER

RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-9986-1	WAA-01-AF-PS-20141223	Filter	12/23/14 15:38	12/29/14 11:30
160-9986-2	WAA-02-AF-PS-20141223	Filter	12/23/14 14:15	12/29/14 11:30
160-9986-3	WAA-03-AF-PS-20141223	Filter	12/23/14 14:45	12/29/14 11:30
160-9986-4	WAA-04-AF-PS-20141223	Filter	12/23/14 15:02	12/29/14 11:30
160-9986-5	WAA-05-AF-PS-20141223	Filter	12/23/14 14:27	12/29/14 11:30
160-9986-6	WAA-00-AF-FB-20141223	Filter	12/23/14 00:00	12/29/14 11:30

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Client: Tetra Tech EM Inc.

Project/Site. West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Client Sample ID: WAA-01-AF-PS-20141223

Date Collected: 12/23/14 15:38 Date Received: 12/29/14 11:30

Lab Sample ID: 160-9986-1

Matrix: Filter

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.487	3	0.288	0,292	1.00	0,407	pCi/Sample	01/07/15 10.34	01/13/15 22 15	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					01/07/15 10:34	01/13/15 22:15	1

			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL.	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0353	Щ	0.0999	0.100	1.00	0.180	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-230	0.456	3	0.132	0.137	1.00	0.0847	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-232	0.0440	フ	0,0393	0.0395	1 00	0.0264	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	80.7		30 - 110					01/07/15 08:19	01/09/15 11:39	1

Method: A-01-R - Iso	topic Uraniu	m (Alpha S	pectrometry)						
				Count	Total						
		_		Uncert	Uncert.	-	****				015
Analyte	Result	Qu	alifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Faç
Uranium-233/234	0.0698		7	0,0515	0.0518	1,00	0.0594	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Uranium-235/236	0.000	W		0.0193	0.0193	1.00	0.0290	pCi/Sample	01/07/15 08:19	01/09/15 11.41	1
Uranium-238	0.0387		3	0.0346	0.0348	1.00	0.0232	pCi/Sample	01/07/15 08 19	01/09/15 11.41	1
Tracer	% Yield	Qu	alifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	94.8			30 - 110					01/07/15 08 19	01/09/15 11:41	1

Client Sample ID: WAA-02-AF-PS-20141223

Date Collected: 12/23/14 14:15 Date Received: 12/29/14 11:30 Lab Sample ID: 160-9986-2

Matrix: Filter

			Count Uncert.	Total Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	-0.0600	W	0.238	0.238	1.00	0.467	pCi/Sample	01/07/15 10:34	01/13/15 22:15	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	100		40 - 110					01/07/15 10:34	01/13/15 22 15	1

Method: A-01-R - Isoto	pic Thoriu	ım (Alpha S	pectrometry	}						
			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	ŔĹ	MDC	Unit	Prepared	Analyzed	Oil Fac
Thorium-228	0.154	61	0 129	0 130	1.00	0.202	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-230	0.440	3	0,126	0 131	1,00	0 0896	pCi/Sample	01/07/15 08:19	01/09/15 11 39	1
Thorlum-232	0.0846	>	0.0571	0.0576	1.00	0.0619	pCi/Sample	01/07/15 08:19	01/09/15 11 39	1

HUE 25 Feb 15

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

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Lab Sample ID: 160-9986-2 Matrix: Filter

Client Sample ID: WAA-02-AF-PS-20141223 Date Collected: 12/23/14 14:15

Date Received: 12/29/14 11:30

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	91.2		30 - 110					01/07/15 08 19	01/09/15 11:39	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+1-)	(20+/-)	ŘĹ.	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0757	y A	0.0506	0,0609	1.00	0 0838	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
Uranium-235/236	0.0283	7	0.0326	0.0327	1.00	0.0283	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
Uranium-238	0.0605	3	0.0478	0.0481	1,00	0.0578	pCi/Sample	01/07/15 08 19	01/09/15 11:41	1
Tracer	%Yield	Qualifier	Limits					Propared	Analyzed	Dil Fac
Uranium-232	95.6		30 - 110					01/07/15 08 19	01/09/15 11:41	1

Client Sample ID: WAA-03-AF-PS-20141223

Date Collected: 12/23/14 14:45

Lab Sample ID: 160-9986-3

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)								
			Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.0407		0.243	0.243	1.00	0.450	pCi/Sample	01/07/15 10:34	01/13/15 22:15	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	100		40 - 110					01/07/15 10:34	01/13/15 22 15	1
Method: A-01-R - Iso			Count Uncert	Totaf Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.121	W	0,101	0.101	(1.00)	0.155	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-230	0.367	7	0.108	0.112	1,00	0,0581	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-232	0.0645	3	0.0491	0.0494	1.00	0 0578	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	96.3		30 - 110					01/07/15 08 19	01/09/15 11 39	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			UncerL	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0634	M	0.0634	0.0636	1.00	0.0975	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
Uranium-235/236	0.0197	W _	0.0279	0.0279	1,00	0.0296	pCi/Sample	01/07/15 08 19	01/09/15 11.41	1
Uranium-238	0.0870)	0.0570	0.0575	1,00	0 0605	pCi/Sample	01/07/15 08 19	01/09/15 11:41	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	87.9		30 - 110					01/07/15 08 19	01/09/15 11 41	1

HUE 25 Feb 15

Client Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Client Sample ID: WAA-04-AF-PS-20141223 Lab Sample ID: 160-9986-4

Date Collected: 12/23/14 15:02 Date Received: 12/29/14 11:30

Matrix: Filter

Method: 9315 - Total			Count Uncert.	Total Uncert.	RL	MADIC	11-:4	P	411	D'' E
Analyte Tolal Alpha Radium	0.0280	Qualifier	(2 0+/-) 0.259	0,259	(1.00)	MDC 0.488	Unit pCi/Sample	O1/07/15 10:34	Analyzed 01/13/15 22:15	Dil Fac
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
									-1	
Ba Carrier	104		40 - 110					01/07/15 10:34	01/13/15 22 15	
		ım (Alpha S						01/07/15 10:34	01/13/15 22-15	
		ım (Alpha S		Total				01/07/15 10:34	01/13/15 22 15	1
		ım (Alpha S	pectrometry)					01/07/15 10:34	01/13/15 22 15	1
Method: A-01-R - Iso	topic Thoriu	ım (Alpha S Qualifier	pectrometry) Count	Total	RL	MDC	Unit	01/07/15 10:34	01/13/15 22 15	Dîl Fac
Method: A-01-R - Iso	topic Thoriu		pectrometry) Count Uncert.	Total Uncert	RL 1.00	MDC 0.139	Unit pCi/Sample			Dil Fac
Ba Carrier Method: A-01-R - Iso Analyte Thorium-228 Thorium-230	topic Thoriu		pectrometry) Count Uncert. (20+/-)	Total Uncert (2σ+/-)			pCi/Sample	Prepared	Analyzed	Dil Fac

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

91.4

87.6

%Yield Qualifier

Limits

30.110

30 - 110

			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(2 0+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.112	3	0.0643	0.0649	1,00	0.0615	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Uranium-235/238	0.000	W	0.0283	0.0283	1.00	0,0765	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Uranium-238	0.0721	3	0.0481	0.0485	1,00	0.0240	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Client Sample ID: WAA-05-AF-PS-20141223

Date Collected: 12/23/14 14:27 Date Received: 12/29/14 11:30

Tracer

Thorium-229

Uranium-232

Lab Sample ID: 160-9986-5

01/07/15 08 19 01/09/15 11 41

Analyzed

01/09/15 11:39

Dii Fac

Prepared

01/07/15 08 19

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)								
			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+1-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0 0764	W	0 222	0.222	1.00	0 402	pCi/Sample	01/07/15 10:34	01/13/15 22:15	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	102		40 - 110					01/07/15 10:34	01/13/15 22 15	1
Analyte	Result	Qualifier	Count Uncert. (20+/-)	Total Uncert (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.128	a	0.102	0.103	1.00	0.156	pCi/Sample	01/07/15 08 19	01/09/15 11 39	1
Thorium-230	0,317	J	0.0984	0 102	1.00	0.0229	pCi/Sample	01/07/15 08 19	01/09/15 11 39	1
Thorium-232	0.0380	Uh -	0.0402	0.0404	Kod	0 0562	pCi/Sample	01/07/15 08 19	01/09/15 11 39	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	96 8		30 - 110			1 1		01/07/15 08 19	01/09/15 11 39	1

TestAmerica St Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Client Sample ID: WAA-05-AF-PS-20141223

Date Collected: 12/23/14 14:27 Date Received: 12/29/14 11:30 Lab Sample ID: 160-9986-5

Matrix: Filter

Welnou: A-U1-R - ISC	itopic uranii	o suqiA) mi	pectrometry	}						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0396	dy	0.0525	0.0526	1.00	0.0875	pCi/Sample	01/07/15 08 19	01/09/15 11:41	1
Uranium-235/238	0.0197	21	0.0279	0.0279	1.00	0.0295	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Uranium-238	0.0711	7	0.0524	0.0527	1.00	0.0805	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1

 Uranium-238
 0.0711
 0.0524
 0.0527
 1.00
 0.0805
 pCi/Sample
 01/07/15 08:19
 01/09/15 11:41
 1

 Tracer
 % Yield
 Qualifier
 Limits
 Prepared
 Analyzed
 Dit Fac

 Uranium-232
 92.1
 30 - 110
 01/07/15 08:19
 01/09/15 11:41
 1

Client Sample ID: WAA-00-AF-FB-20141223

Date Collected: 12/23/14 00:00 Date Received: 12/29/14 11:30 Lab Sample ID: 160-9986-6

Matrix. Filter

Method:	9375 -	lotal Apna	Radium (GFPC)	

			Count	lotai						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+1-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,181		0.281	0.282	1.00	0,478	pCi/Sample	01/07/15 10:34	01/13/15 22:15	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrior	00.4		40 110					01/07/15 10-24	74/42/4E 22 4E	4

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.120	W_	0.108	0.108	1.00	0.169	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-230	0.614		0.142	0,151	1.00	0.0614	pCi/Sample	01/07/15 08 19	01/09/15 11:39	1
Thorium-232	0.0319	W	0.0391	0.0392	1.00	0.0611	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thonum-229	92.8		30 - 110					01/07/15 08 19	01/09/15 11 39	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	{2σ+ <i>l</i> -)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.107	7	0.0573	0.0580	1.00	0.0230	pCi/Sample	01/07/15 08 19	01/09/15 11.41	1
Uranium-235/236	0 000	W.	0.0190	0 0190	(1.00)	0.0286	pCl/Sample	01/07/15 08:19	01/09/15 11 41	1
Uranium-238	0.107	7	0 0511	0.0618	1.00	0 0585	pCi/Sample	01/07/15 08:19	01/09/15 11 41	1
Tracer	%Yield	Qualifier	Limit\$					Prepared	Analyzed	Dil Fac
Uranium-232	93.2		30 - 110		0.0			01/07/15 08.19	01/09/15 11 41	1

Total

HVE 25 Pel 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-167121/1-A

Matrix: Filter

Analysis Batch: 168078

Client Sample ID: Method Blank Prep Type: Total/NA

Analyzed

01/13/15 18:50

Prep Batch: 167121

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.1274	U	0.281	0.281	1.00	0.492	pCi/Sample	01/07/15 10:34	01/13/15 18:50	1

MB MB

Limits Carrier %Yield Qualifier 40 - 110 Ba Carrier 96.5

Client Sample ID: Lab Control Sample

Prepared

01/07/15 10:34

Prep Type: Total/NA **Prep Batch: 167121**

Lab Sample ID: LCS 160-167121/2-A **Matrix: Filter**

Analysis Batch: 168078

Total LCS LCS Spike Uncert.

%Rec.

Added (2σ+/-) Analyte Result Qual RL MDC Unit %Rec Limits 45.0 4.48 1.00 0.484 pCi/Samp 100 44.95 65 - 150 Total Alpha

Radium

LCS LCS

Carrier %Yield Qualifier Limits Ba Carrier 40 - 110 95.6

Lab Sample ID: LCSD 160-167121/3-A

Matrix: Filter

Analysis Batch: 168078

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 167121

Total Spike LCSD LCSD Uncert.

%Rec. RER Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits RER Limit Total Alpha 45.0 46.19 4.59 1.00 0.371 pCi/Samp 103

Radium

LCSD LCSD

Carrier %Yield Qualifier Limits Ba Carrier 95.3 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

ab Sample ID: MB 160-167107/1-A Client Sample ID: Method Blank

Lab Sample ID. IND 100-1071071-A	Offent Sample ID. Method Blank
Matrix: Filter	Prep Type: Total/NA
Analysis Batch: 167575	Prep Batch: 167107
Count Total	

	МВ	МВ	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.1261	U	0.0995	0.100	1.00	0.151	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-230	0.1988		0.0851	0.0867	1.00	0.0823	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1
Thorium-232	0.01795	U	0.0350	0.0350	1.00	0.0654	pCi/Sample	01/07/15 08:19	01/09/15 11:39	1

	МВ	MB				
Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	99.5		30 - 110	01/07/15 08:19	01/09/15 11:39	

TestAmerica St. Louis

Dil Fac

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-167107/2-A

Matrix: Filter

Analysis Batch: 167576

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 167107

				i otai						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Thorium-230	16.1	17.04		1.61	1.00	0.111	pCi/Samp	106	81 - 118	

LCS LCS

 Tracer
 %Yield
 Qualifier
 Limits

 Thorium-229
 92.1
 30 - 110

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 167107

Lab Sample ID: LCSD 160-167107/3-A

Matrix: Filter

Analysis Batch: 167577

				Total						
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	RER	Limit
Thorium-230	16.1	17.82		1.69	1.00	0.0645 pCi/Samp	111	81 - 118	0.24	1

LCSD LCSD

 Tracer
 %Yield Thorium-229
 Qualifier
 Limits

 84.8
 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-167108/1-A

Matrix: Filter

Analysis Batch: 167587

Client	Sampl	o ID:	Method	Plank
Cilent	Sampi	e iv:	wethod	Diank

Prep Type: Total/NA

Prep Batch: 167108

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.07073	U	0.0609	0.0612	1.00	0.0869	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
Uranium-235/236	0.009779	U	0.0196	0.0196	1.00	0.0293	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
Uranium-238	0.02353		0.0272	0.0272	1.00	0.0235	pCi/Sample	01/07/15 08:19	01/09/15 11:41	1
	**5									
	MB	MB								

 Tracer
 %Yield Uranium-232
 Qualifier
 Limits
 Prepared 01/07/15 08:19
 Analyzed 01/09/15 11:41
 Dil Fac 01/07/15 08:19

 Uranium-232
 91.4
 30 - 110
 01/07/15 08:19
 01/09/15 11:41
 1

Lab Sample ID: LCS 160-167108/2-A

Matrix: Filter

Analysis Batch: 167588

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 167108

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Uranium-233/23	25.5	25.69		2.37	1.00	0.0714	pCi/Samp	101	84 - 120	
4										
Uranium-238	26.0	25.18		2.33	1.00	0.0279	pCi/Samp	97	82 - 122	

LCS LCS

 Tracer
 %Yield Qualifier
 Limits

 Uranium-232
 77.9
 30 - 110

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

TestAmerica Job ID: 160-9986-1 Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCSD 160-167108/3-A

Matrix: Filter

Analysis Batch: 167589

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

Prep Batch: 167108

				Total							
	Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23	25.5	24.95		2.29	1.00	0.0827	pCi/Samp	98	84 - 120	0.16	1
4 Uranium-238	26.0	25.90		2.37	1.00	0.0259	pCi/Samp	99	82 - 122	0.15	1

LCSD LCSD

%Yield Qualifier Limits Tracer 30 - 110 Uranium-232 86.5

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-9986-1

Rad

Prep Batch: 167107

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-9986-1	WAA-01-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-2	WAA-02-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-3	WAA-03-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-4	WAA-04-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-5	WAA-05-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-6	WAA-00-AF-FB-20141223	Total/NA	Filter	ExtChrom	
LCS 160-167107/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-167107/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-167107/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 167108

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-9986-1	WAA-01-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-2	WAA-02-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-3	WAA-03-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-4	WAA-04-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-5	WAA-05-AF-PS-20141223	Total/NA	Filter	ExtChrom	
160-9986-6	WAA-00-AF-FB-20141223	Total/NA	Filter	ExtChrom	
LCS 160-167108/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-167108/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-167108/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 167121

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
160-9986-1	WAA-01-AF-PS-20141223	Total/NA	Filter	DPS-0	-
160-9986-2	WAA-02-AF-PS-20141223	Total/NA	Filter	DPS-0	
160-9986-3	WAA-03-AF-PS-20141223	Total/NA	Filter	DPS-0	
160-9986-4	WAA-04-AF-PS-20141223	Total/NA	Filter	DPS-0	
160-9986-5	WAA-05-AF-PS-20141223	Total/NA	Filter	DPS-0	
160-9986-6	WAA-00-AF-FB-20141223	Total/NA	Filter	DPS-0	
LCS 160-167121/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-167121/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-167121/1-A	Method Blank	Total/NA	Filter	DPS-0	

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TestAmerica Job ID: 160-9986-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-9986-1	WAA-01-AF-PS-20141223	101	
160-9986-2	WAA-02-AF-PS-20141223	100	
160-9986-3	WAA-03-AF-PS-20141223	100	
160-9986-4	WAA-04-AF-PS-20141223	104	
160-9986-5	WAA-05-AF-PS-20141223	102	
160-9986-6	WAA-00-AF-FB-20141223	99.4	
LCS 160-167121/2-A	Lab Control Sample	95.6	
LCSD 160-167121/3-A	Lab Control Sample Dup	95.3	
MB 160-167121/1-A	Method Blank	96.5	
Tracer/Carrier Legend			
Ba = Ba Carrier			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-9986-1	WAA-01-AF-PS-20141223	80.7	
160-9986-2	WAA-02-AF-PS-20141223	91.2	
160-9986-3	WAA-03-AF-PS-20141223	96.3	
160-9986-4	WAA-04-AF-PS-20141223	91.4	
160-9986-5	WAA-05-AF-PS-20141223	96.8	
160-9986-6	WAA-00-AF-FB-20141223	92.8	
LCS 160-167107/2-A	Lab Control Sample	92.1	
LCSD 160-167107/3-A	Lab Control Sample Dup	84.8	
MB 160-167107/1-A	Method Blank	99.5	

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-9986-1	WAA-01-AF-PS-20141223	94.8	
160-9986-2	WAA-02-AF-PS-20141223	95.6	
160-9986-3	WAA-03-AF-PS-20141223	87.9	
160-9986-4	WAA-04-AF-PS-20141223	87.6	
160-9986-5	WAA-05-AF-PS-20141223	92.1	
160-9986-6	WAA-00-AF-FB-20141223	93.2	
_CS 160-167108/2-A	Lab Control Sample	77.9	
LCSD 160-167108/3-A	Lab Control Sample Dup	86.5	
MB 160-167108/1-A	Method Blank	91.4	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	te: West Lake Landfill Site, Bridgeton, Missouri										
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)										
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)										
Review Date	February 25, 2015										
Sample Delivery Group (SDG):	J10012										
Sample Numbers:	WAA-01-AF-PS-20141231, WAA-02-AF-PS-20141231, WAA-03-AF-PS-20141231, WAA-04-AF-PS-20141231, WAA-05-AF-PS-20141231, and WAA-00-AF-FB-20141231										
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank										
Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological in the applicable normal package and the available field and laboratory Ellis, certify that all data values.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.										
	· · · · · · · · · · · · · · · · · · ·										
Certified by Harry Ellis, Chemist	Date										

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10012 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank and field blank yielded low activities for one (of three) thorium isotopes and for none (of three) uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10012-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Rhonda Ridenhower

Authorized for release by: 1/29/2015 10:28:35 AM

Rhonda Ridenhower, Manager of Project Management rhonda.ridenhower@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com



Review your project results through

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Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10012-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Job ID: 160-10012-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10012-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 01/05/2015; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

The following samples are filters that were split between multiple analyses: WAA-00-AF-FB-20141231 (160-10012-6), WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5). A LCS/LCSD was performed as batch QC.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5) and WAA-00-AF-FB-20141231 (160-10012-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 01/13/2015 and analyzed on 01/23/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Job ID: 160-10012-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5) and WAA-00-AF-FB-20141231 (160-10012-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/13/2015 and analyzed on 01/14/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5) and WAA-00-AF-FB-20141231 (160-10012-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/13/2015 and analyzed on 01/14/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record

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			Sample			Filtered Sample (Y / N	9310 Gross Alpha/Beta	R G	9315 Total Alpha Radium	A-01-R Isotopic Thorium	9315 Radium-226 (GFPC)			-	1 1				 				
	Sample	Sample	Type (C=Comp,		# of	ë	00	GA-01-R	5 T	뉴 뉴	151					-	1						
Sample Identification	Date	Time	G=Grab)	Matrix	Cont.	E a	93	δ	931	A A	86					1				Sampi	e Specific	Notes:	
WAA-01-AF-PS-20141231	12/31/14	10:17	Filter	Air	1		Х	х	х	хх	(x						T		* 9:	315 Radiur			
WAA-02-AF-PS-20141231	12/31/14	10:33	Filter	Aìr	1		×	х	х	хх	(x		П	\top	\Box					ntingent up			
WAA-03-AF-PS-20141231	12/31/14	11:14	Filter	Air	. 1	П	X	х	х	ХX	(x						1		for	all sample			\neg
WAA-04-AF-PS-20141231	12/31/14	11:30	Filter	Air	1	П	X	Х	х	хх	(x		\Box	\top	\Box								
0 WAA-05-AF-PS-20141231	12/31/14	10:50	Filter	Air	1	H	Х	х	x	хх	1 1			\top	П		1	П					
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Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5= Possible Hazard Identification:	NaOH; 6=	Other																					
Are any samples from a listed EPA Hazardous Waste? Please I Comments Section if the lab is to dispose of the sample.	ist any EPA	Naste Co	des for the	sample	in the	s	amp	le Di	ispo	sai (A fee	may b	e ass	essec	l if sa	mple	s are	reta	ained lo	nger than	1 month)		
☑Non-Hazard ☐Flammable ☐Skin Irritant	Poison	В	Unkno	wn		\dashv		Return	to C	lient		Прі	sposal	by Lab		Г	Archi	ive for	r	Months			
Special Instructions/QC Requirements & Comments:				****					-		-		•			<u> </u>							
Custody Seals Intact: Yes No	Custody S	eal No.:							Coo	ler Te	mp. (°	C): Ob:	s'd:		Со	rr'd:		***	Thern	n ID No.:			
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Client: Tetra Tech EM Inc. Job Number: 160-10012-1

Login Number: 10012 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

Creator: Clarke, Jili C		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10012-1

Qualifiers

Rad

ND PQL

QC RER

RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10012-1	WAA-01-AF-PS-20141231	Filter	12/31/14 10:17	01/05/15 12:45
160-10012-2	WAA-02-AF-PS-20141231	Filter	12/31/14 10:33	01/05/15 12:45
160-10012-3	WAA-03-AF-PS-20141231	Filter	12/31/14 11:14	01/05/15 12:45
160-10012-4	WAA-04-AF-PS-20141231	Filter	12/31/14 11:30	01/05/15 12:45
160-10012-5	WAA-05-AF-PS-20141231	Filter	12/31/14 10:50	01/05/15 12:45
160-10012-6	WAA-00-AF-FB-20141231	Filter	12/31/14 00:00	01/05/15 12:45

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Client. Tetra Tech EM Inc.

Ba Carrier

Project/Site. West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Client Sample ID: WAA-01-AF-PS-20141231

Date Collected: 12/31/14 10:17 Date Received: 01/05/15 12:45 Lab Sample ID: 160-10012-1

01/23/15 09 40

01/13/15 12:12

Matrix: Filter

Method: 9315 - Total	Apha Radiu	m (GFPC)								
	,		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Oil Fac
Total Alpha Radium	0.0492	4	0 306	0 306	1.00	0,589	pCi/Sample	01/13/15 12 12	01/23/15 09:40	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

40-110

30 - 110

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0,0590	4	0.119	0.119	1.00	0.234	pCi/Sample	01/13/15 07:50	01/14/15 13:20	1
Thorium-230	0,304	J	0.233	0.235	1.00	0.234	pCi/Sample	01/13/15 07:50	01/14/15 13:20	1
Thorium-232	0 0409	W	0.0818	0.0818	1.00	0 123	pCi/Sample	01/13/15 07:50	01/14/15 13:20	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	93.7		30 - 110					01/13/15 07 50	01/14/15 13 20	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

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			COLIN	1000						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.218	4	0.212	0.213	1.00	0.245	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Uranium-235/238	0.000	Ú/	0.0220	0.0220	1,00	0.176	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-238	-0,0353	W	0.0353	0,0354	1.00	0,287	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Client Sample ID: WAA-02-AF-PS-20141231

Date Collected: 12/31/14 10:33 Date Received: 01/05/15 12:45

Uranium-232

Lab Sample ID: 160-10012-2

01/13/15 07:50 01/14/15 13:23

Matrix: Filter

Method: 9315 - Total	Apha Radiu	ım (GFPC)								
		` '	Count	Total						
			UncerL	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.290	W	0.370	0.371	1.00	0.616	pCi/Sample	01/13/15 12 12	01/23/15 09 41	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	96.8		40 - 110					01/13/15 12 12	01/23/15 09 41	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(2a+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.00816	4	0.163	0.163	1.00	0 392	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Thorium-230	0.267	u	0,234	0.235	1.00	0 281	pCi/Sample	01/13/15 07 50	01/14/15 13 20	1
Thorium-232	0.0866	U	0.122	0 123	1.00	0.130	pCi/Sample	01/13/15 07 50	01/14/15 13 20	1.

HUE 25 Feb 15

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfilt - Filters

TestAmerica Job ID 160-10012-1

Lab Sample ID: 160-10012-2

Client Sample ID: WAA-02-AF-PS-20141231

Date Collected: 12/31/14 10:33 Date Received: 01/05/15.12:45

Matrix: Filter

Tracer	%Yield	Qualitier	Limits					Prepared	Analyzed	Dit Fac
Thorium-229	86.3		30 - 110					01/13/15 07.50	01/14/15 13.20	1
Method: A-01-R - iso	otopic Uraniu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.134	W	0.179	0.179	1.00	0.284	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Uranium-235/236	0.0886	61	0.157	0.157	1.00	0.283	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Uranium-238	0.0547	181	0.128	0.128	1.00	0,267	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	83.7		30 - 110					01/13/15 07 50	01/14/15 13:23	1

Client Sample ID: WAA-03-AF-PS-20141231

Date Collected: 12/31/14 11:14

Date Received: 01/05/15 12:45

Lab Sample ID: 160-10012-3

Matrix: Filter

Method: 9315 - Total		(2.7.2)	Count UncerL	Total Uncert.						
Analyte	Result	Qualifier	(2σ+ <i>l</i> -)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.240	ul	0,413	0.413	1.00	0.715	pCi/Sample	01/13/15 12:12	01/23/15 09:41	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					01/13/15 12:12	01/23/15 09:41	1
Method: A-01-R - Iso	otopic Thoriu	m (Alpha S	-							
			Count	Yotal						
			UncerL	Uncert.						
Analyte		Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0960	4	0,151	0.151	1.00	0.261	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Thorium-230	0.367		0.25T	0.259	1.00	0.222	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Thorium-232	-0.00797	U	0.0159	0.0159	1.00	0.193	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.5		30 - 110					01/13/15 07:50	01/14/15 13 20	1
Method: A-01-R - Iso	otopic Uraniu	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncerl.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.123	W/	0,165	0.165	1.00	0.244	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-235/235	0.000	y	0.0219	0.0219	1.00	0 175	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Uranium-238	0 0937	01	0 133	0.133	1.00	0.141	pCi/Sample	01/13/15 07 50	01/14/15 13 23	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

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Client: Tetra Tech EM Inc.

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Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Client Sample ID: WAA-04-AF-PS-20141231

Date Collected: 12/31/14 11:30 Date Received: 01/05/15 12:45 Lab Sample ID: 160-10012-4

01/13/15 12:12 01/23/15 12:37

Matrix: Filter

Method: 9315 - Total	Apha Radii	ım (GFPC)								
			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(2 0+/-)	(2g+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.109	Ol .	0.405	0.405	1.00	0,737	pCi/Sample	01/13/15 12 12	01/23/15 12 37	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

99.4

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0,0934	W	0.202	0.203	1.00	0.389	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Thorium-230	0.145	W	0,173	0.174	1.00	0.245	pCi/Sample	01/13/15 07 50	01/14/15 13 20	1
Thorlum-232	0.0696	W	0.123	0.123	1.00	0,223	pCi/Sample	01/13/15 07 50	01/14/15 13:20	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	88.6		30 - 110					01/13/15 07:50	01/14/15 13:20	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 0+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0543	4	0.127	0.127	1.00	0.265	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-235/236	-0.0101	W	0.0203	0.0203	1.00	0.246	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-238	0.0352	u	0 0882	0.0882	1.00	0.197	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Tengor	¥ Viold	Austiliar	l imite					Prenared	Analyzed	Dil Fac

30 - 110

Client Sample ID: WAA-05-AF-PS-20141231

86.2

%Yield Qualifier

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Date Collected: 12/31/14 10:50

Uranium-232

Tracer

Thonum-229

Lab Sample ID: 160-10012-5 Matrix: Filter

01/13/15 07:50 01/14/15 13:23

Prepared

01/13/15 07:50

Date Received: 01/05/15 12:45

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 0+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.199	W	0,391	0.391	1.00	0.686	pCi/Sample	01/13/15 12 12	01/23/15 12.37	1
Carrier	% Yield	Qualifler	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	102	-	40 - 110					01/13/15 12 12	01/23/15 12:37	1
Da Çamer	702		.0-,.0							
		ım (Alpha S								
		ım (Alpha S		Total						
		rm (Alpha S	Spectrometry)							
Method: A-01-R - Iso	topic Thoriu	tm (Alpha S Qualifier	Spectrometry) Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Method: A-01-R - Iso	topic Thoriu	Qualifler	Spectrometry) Count Uncert	Total Uncert.	RL (1.00)	MDC 0.372		Prepared 01/13/15 07:50	Analyzed 01/14/15 13:20	Dil Fac
Method: A-01-R - Iso Analyte	otopic Thoriu Result	Qualifler	Spectrometry) Count Uncert. (20+/-)	Total Uncert. (2σ+/-)				· · · · · · · · · · · · · · · · · · ·		Dil Fac

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TestAmerica St. Louis

Analyzed

01/14/15 13 20

Dil Fac

Client, Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Client Sample ID: WAA-05-AF-PS-20141231

Date Collected: 12/31/14 10:50 Date Received: 01/05/15 12:45 Lab Sample ID: 160-10012-5

TestAmerica Job ID: 160-10012-1

Matrix: Filter

			Count Uncert.	Total Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0,116	U	0.155	0.158	1.00	0 230	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Uranium-235/238	-0.0104	0/	0.0207	0.0207	1.00	0 251	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-238	0.0111	a	0.0946	0.0946	1.00	0 270	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	81.2	-	30 - 110					01/13/15 07 50	01/14/15 13 23	1

Client Sample ID: WAA-00-AF-FB-20141231

Date Collected: 12/31/14 00:00 Date Received: 01/05/15 12:45 Lab Sample ID: 160-10012-6

Matrix: Filter

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.349	M	0.385	0,387	1.00	0.624	pCi/Sample	01/13/15 12 12	01/23/15 12 37	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					01/13/15 12 12	01/23/15 12:37	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry))						
			Count	Total						
			Uncert	Uncert.						
Analyte		Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.00701	illy 7	0.157	0,157	1.08	0.404	pCi/Sample	01/13/15 07 50	01/14/15 13:20	1
Thorium-230	0.648		0.370	0.374	1.00	0.266	pCi/Sample	01/13/15 07:50	01/14/15 13 20	1
Thonum-232	0.000	u	0.0191	0,0191	1.00	0.153	pCi/Sample	01/13/15 07 50	01/14/15 13 20	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	74.5		30 - 110					01/13/15 07:50	01/14/15 13 20	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0756	W	0.204	0,204	1.00	0.416	pCi/Sample	01/13/15 07 50	01/14/15 13:23	1
Uranium-235/236	0.0489	4	0,123	0.123	1.00	0.274	pCi/Sample	01/13/15 07 50	01/14/15 13 23	1
Uranium-238	-0,0543	uci	0.0444	0,0446	000	0.329	pCi/Sample	01/13/15 07:50	01/14/15 13 23	1
Tracer	% Yield	Qualifler	Limits					Propared	Analyzed	Dil Fac
								01/13/15 07 50	01/14/15 13 23	

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25 Feb 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-168177/1-A

Matrix: Filter

Analysis Batch: 170022

Client Sample ID: Method Blank

Analyzed

01/23/15 09:40

Prep Type: Total/NA

Prep Batch: 168177

1				Count	I Olai						
l		MB	MB	Uncert.	Uncert.						
	Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Total Alpha Radium	-0.3395	U	0.374	0.375	1.00	0.832	pCi/Sample	01/13/15 12:12	01/23/15 09:40	1

MB MB

Carrier %Yield Qualifier I imits 40 - 110 Ba Carrier 96.5

Client Sample ID: Lab Control Sample

Prepared

01/13/15 12:12

Prep Type: Total/NA

Prep Batch: 168177

Lab Sample ID: LCS 160-168177/2-A

Matrix: Filter

Analysis Batch: 170022

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Total Alpha	45.0	44.76		4.96	1.00	0.947	pCi/Samp	100	65 - 150	
Radium										

LCS LCS

%Yield Qualifier Carrier Ba Carrier 40 - 110 92.6

Lab Sample ID: LCSD 160-168177/3-A

Matrix: Filter

Analysis Batch: 170022

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 168177

Total Spike LCSD LCSD Uncert. %Rec. RER Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit Total Alpha 45.0 43.92 4.73 1.00 0.724 pCi/Samp 65 - 150

Radium

LCSD LCSD Carrier %Yield Qualifier Limits Ba Carrier 94.7 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-168044/1-A

Matrix: Filter

Analysis Batch: 168461

Client San	nple ID:	Method	d Blank
	Prep '	Type: T	otal/NA

Prep Batch: 168044

		Count	i otai						
MB	MB	Uncert.	Uncert.						
Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
-0.02872	U	0.147	0.147	1.00	0.381	pCi/Sample	01/13/15 07:50	01/14/15 13:19	1
0.2469		0.204	0.205	1.00	0.217	pCi/Sample	01/13/15 07:50	01/14/15 13:19	1
-0.01430	U	0.0202	0.0203	1.00	0.198	pCi/Sample	01/13/15 07:50	01/14/15 13:19	1
	-0.02872 0.2469	Result Qualifier -0.02872 U	MB MB Uncert. Result Qualifier (2σ+/-) -0.02872 U 0.147 0.2469 0.204	MB MB Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) -0.02872 U 0.147 0.147 0.2469 0.204 0.205	MB Result 2-0.02872 Qualifier Uncert. (2σ+/-) (2σ+/-) RL 0.2469 0.204 0.205 1.00	MB MB Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) RL MDC -0.02872 U 0.147 0.147 1.00 0.381 0.2469 0.204 0.205 1.00 0.217	MB MB Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit -0.02872 U 0.147 0.147 1.00 0.381 pCi/Sample 0.2469 0.204 0.205 1.00 0.217 pCi/Sample	MB Result Qualifier (2σ+/-) (2σ+/-) RL (2σ+/-) MDC (Dilt (MDC) Prepared (MDC) -0.02872 U 0.147 0.147 1.00 0.381 pCi/Sample (MDC) 01/13/15 07:50 0.2469 0.204 0.205 1.00 0.217 pCi/Sample (MDC) 01/13/15 07:50	MB MB Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyzed -0.02872 U 0.147 0.147 1.00 0.381 pCi/Sample 01/13/15 07:50 01/14/15 13:19 0.2469 0.204 0.205 1.00 0.217 pCi/Sample 01/13/15 07:50 01/14/15 13:19

мв мв

Tracer %Yield Qualifier Limits Prepared Analyzed Thorium-229 30 - 110 01/13/15 07:50 99.8 01/14/15 13:19

TestAmerica St. Louis

Dil Fac

TestAmerica Job ID: 160-10012-1

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-168044/2-A **Client Sample ID: Lab Control Sample Matrix: Filter** Prep Type: Total/NA **Prep Batch: 168044**

Analysis Batch: 168462

•				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Thorium-230	16.1	17.70		2.27	1.00	0.235	pCi/Samp	110	81 - 118

LCS LCS %Yield Qualifier Tracer Limits Thorium-229 92.3 30 - 110

Lab Sample ID: LCSD 160-168044/3-A

Matrix: Filter

Analysis Detaly 400402

Analysis Batch: 168463								Prep B	satch: 1	68044
				Total						
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	RER	Limit
Thorium-230	16.1	18.64		2.40	1.00	0.327 pCi/Samp	116	81 - 118	0.20	1

LCSD LCSD Tracer %Yield Qualifier Limits Thorium-229 84.7 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-168045/1-A Client Sample ID: Method Blank Prep Type: Total/NA **Matrix: Filter** Prep Batch: 168045

Analysis Batch: 168472

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			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	-0.03842	U	0.102	0.102	1.00	0.347	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-235/236	-0.02049	U	0.0290	0.0290	1.00	0.284	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
Uranium-238	0.07395	U	0.158	0.158	1.00	0.311	pCi/Sample	01/13/15 07:50	01/14/15 13:23	1
	МВ	MB								

%Yield Qualifier Limits Prepared Analyzed Tracer Dil Fac 01/14/15 13:23 89.6 30 - 110 01/13/15 07:50 Uranium-232

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ab Sample ID: LCS 160-168045/2-A	Client Sample ID: Lab Control Sample
atrix: Filter	Prep Type: Total/NA
nalysis Batch: 168473	Prep Batch: 168045
	_ , .

				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Uranium-233/23	25.5	23.16		2.87	1.00	0.251	pCi/Samp	91	84 - 120
4									
Uranium-238	26.0	24.73		3.02	1.00	0.294	pCi/Samp	95	82 - 122
LCS LCS									
LC3 LC3									

%Yield Qualifier Limits 30 - 110 Uranium-232 74.9

TestAmerica St. Louis

1/29/2015

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCSD 160-168045/3-A

TestAmerica Job ID: 160-10012-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Client Sample ID: Lab Control Sample Dup

Matrix: Filter Analysis Batc	h: 168474										Prep Ty Prep B	, pe: To atch: 1	
						Total					•		
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23			25.5	23.01		2.86	1.00	0.313	pCi/Samp	90	84 - 120	0.03	1
Uranium-238			26.0	24.05		2.95	1.00	0.251	pCi/Samp	92	82 - 122	0.11	1
	LCSD	LCSD											
Tracer	%Yield	Qualifier	Limits										
Uranium-232	76.5		30 - 110										

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-1

Rad

Prep Batch: 168044

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10012-1	WAA-01-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-2	WAA-02-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-3	WAA-03-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-4	WAA-04-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-5	WAA-05-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-6	WAA-00-AF-FB-20141231	Total/NA	Filter	ExtChrom	
LCS 160-168044/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-168044/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-168044/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 168045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10012-1	WAA-01-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-2	WAA-02-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-3	WAA-03-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-4	WAA-04-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-5	WAA-05-AF-PS-20141231	Total/NA	Filter	ExtChrom	
160-10012-6	WAA-00-AF-FB-20141231	Total/NA	Filter	ExtChrom	
LCS 160-168045/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-168045/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-168045/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 168177

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
160-10012-1	WAA-01-AF-PS-20141231	Total/NA	Filter	DPS-0	-
160-10012-2	WAA-02-AF-PS-20141231	Total/NA	Filter	DPS-0	
160-10012-3	WAA-03-AF-PS-20141231	Total/NA	Filter	DPS-0	
160-10012-4	WAA-04-AF-PS-20141231	Total/NA	Filter	DPS-0	
160-10012-5	WAA-05-AF-PS-20141231	Total/NA	Filter	DPS-0	
160-10012-6	WAA-00-AF-FB-20141231	Total/NA	Filter	DPS-0	
LCS 160-168177/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-168177/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-168177/1-A	Method Blank	Total/NA	Filter	DPS-0	

TestAmerica St. Louis

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TestAmerica Job ID: 160-10012-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10012-1	WAA-01-AF-PS-20141231	101	
160-10012-2	WAA-02-AF-PS-20141231	96.8	
160-10012-3	WAA-03-AF-PS-20141231	101	
160-10012-4	WAA-04-AF-PS-20141231	99.4	
160-10012-5	WAA-05-AF-PS-20141231	102	
160-10012-6	WAA-00-AF-FB-20141231	103	
LCS 160-168177/2-A	Lab Control Sample	92.6	
LCSD 160-168177/3-A	Lab Control Sample Dup	94.7	
MB 160-168177/1-A	Method Blank	96.5	

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

watrix: Filter			Prep Type: Total/NA
_			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10012-1	WAA-01-AF-PS-20141231	93.7	
160-10012-2	WAA-02-AF-PS-20141231	86.3	
160-10012-3	WAA-03-AF-PS-20141231	88.5	
160-10012-4	WAA-04-AF-PS-20141231	88.6	
160-10012-5	WAA-05-AF-PS-20141231	89.9	
160-10012-6	WAA-00-AF-FB-20141231	74.5	
LCS 160-168044/2-A	Lab Control Sample	92.3	
LCSD 160-168044/3-A	Lab Control Sample Dup	84.7	
MB 160-168044/1-A	Method Blank	99.8	
Tracer/Carrier Legend			
Th-229 = Thorium-229			
==== Trionam EE			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10012-1	WAA-01-AF-PS-20141231	82.1	
160-10012-2	WAA-02-AF-PS-20141231	83.7	
160-10012-3	WAA-03-AF-PS-20141231	80.5	
160-10012-4	WAA-04-AF-PS-20141231	86.2	
160-10012-5	WAA-05-AF-PS-20141231	81.2	
160-10012-6	WAA-00-AF-FB-20141231	79.5	
_CS 160-168045/2-A	Lab Control Sample	74.9	
_CSD 160-168045/3-A	Lab Control Sample Dup	76.5	
MB 160-168045/1-A	Method Blank	89.6	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J10012
Sample Numbers:	WAA-01-AF-PS-20141231, WAA-02-AF-PS-20141231, WAA-03-AF-PS-20141231, WAA-04-AF-PS-20141231, WAA-05-AF-PS-20141231, and WAA-00-AF-FB-20141231
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Interview was intended to identify apparent from the summary data parallel was found, and data qualificationited to the available field and laboratory. Harry Ellis, certify that all data variables	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was boratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10012 included five (5) environmental air (filter) samples and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded a low gross beta activity and the field blank a somewhat higher beta activity. The other field samples yielded approximately 10 times the field blank beta activity, so no further qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10012-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Rhonda Ridenhower

Authorized for release by: 1/15/2015 4:05:38 PM

Rhonda Ridenhower, Manager of Project Management rhonda.ridenhower@testamericainc.com

Designee for

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com



Review your project results through
Total Access

Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10012-2

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Definitions/Glossary	7
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Sample Summary	9
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QC Sample Results	13
QC Association Summary	15

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Job ID: 160-10012-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10012-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 01/05/2015; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5) and WAA-00-AF-FB-20141231 (160-10012-6) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared and analyzed on 01/07/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

CESIUM 137 & OTHER GAMMA EMITTERS (GS)

Samples WAA-01-AF-PS-20141231 (160-10012-1), WAA-02-AF-PS-20141231 (160-10012-2), WAA-03-AF-PS-20141231 (160-10012-3), WAA-04-AF-PS-20141231 (160-10012-4), WAA-05-AF-PS-20141231 (160-10012-5) and WAA-00-AF-FB-20141231 (160-10012-6) were

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Job ID: 160-10012-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared and analyzed on 01/07/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record

Te	est/	4n	1ei	ric	a
1000					SECTION

Earth City, MO 63045	_															- ₋	ΔΛ	2_		THE LEADER IN ENVIRONMENTAL T	ESTING
phone 314.298.8566 fax		latory Pro		DW	NPDE	3	RCI	RA		Other:					12	< (x	30	_		TestAmerica Laboratorie	s, Inc.
Client Contact		lanager: D		th		Sit	e Cor	ntac	t: D	ave k	Cinrot	h	Da	te: 1-	05-14	7				COC No:	
Tetra Tech, Inc. 415 Oak Street		314-517-67				Lab Contact: Mike Franks				Carrier: NA							1 of1 COCs				
Kansas City, MO 64106		Analysis T								ΙT				Π	Т				T	Sampler:	
(816) 412-1786 Phone	CALEN			KING DAY	S	11	_	ŀ			1				- 1					For Lab Use Only:	
(816) 816-410-1748 FAX		if different fro		20	-		z		٦	_	ျှ		- -		-					Walk-in Client:	
Project Name: West Lake Landfill Site			weeks	:		Z	₽	8	Radium	틜.	Uranium 226 (GFF									Lab Sampling:	
Site: Bridgeton, MO			week days			إيا	SD la/B	Spec	RE	옽.	28 Jan		1								
PO# 1105610	1 7		day			ĕ	₹	Gamm	를	읦.	을 끝									Job / SDG No.:	
			Sample			Sar	rm MS / MSD (Y Gross Alpha/Beta	Ga	a A	[8	Isotopic Radium-2								İ		
	Sample	Sample	Type			ed	E 5	1 2	P	4	3 R									1	
Sample Identification	Date	Time	(C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y	Perform MS / MSD (Y / 9310 Gross Alpha/Beta	GA-01-R	9315 Total Alpha	A-01-R Isotopic Thorium	A-01-R Isotopic Uranium * 9315 Radium-226 (GFPC)									Sample Specific Notes:	
WAA-01-AF-PS-20141231	12/31/14	10:17	Filter	Air	1	Ш	X	X	x	X.	x x									* 9315 Radium-226 (GFPC)	
WAA-02-AF-PS-20141231	12/31/14	10:33	Filter	Air	11	Ц	X	x	х	X.	x x									contingent upon TAR results	
WAA-03-AF-PS-20141231	12/31/14	11:14	Filter	Air	. 1		Х	х	х	x.	x x									for all samples	
WAA-04-AF-PS-20141231	12/31/14	11:30	Filter	Air	1		Х	X	Х	x	хх										
WAA-05-AF-PS-20141231	12/31/14	10:50	Filter	Air	1		Х	x	х	X.	x x				Ī				\top		
WAA-00-AF-FB-20141231	12/31/14	NA	Filter	Air	1		х	x	х	x :	хх								\top		
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	1					Н	\bot	┿	-	\vdash						╄	16	0-100	012	Chain of Custody	
						Ш	\perp		L									-	-		
						Ш															
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5- Possible Hazard Identification:	NaOH; 6=	Other																			
Are any samples from a listed EPA Hazardous Waste? Please I	_ist any EP/	A Waste Co	des for the	sample	in the	ľ	Samp	ole D)ispo	osai (A fee	may	be as	sesse	ed if s	samp	les	are r	etair	ned longer than 1 month)	
Comments Section if the lab is to dispose of the sample.						╝															
Non-Hazard Hammable Skin Irritant	Poison	В	Unkno	wn				Retur	n to C	lient			Disposa	l by La	b			Archive	for_	Months	
Special Instructions/QC Requirements & Comments:																					
Custody Seals Intact: П Yes П No	Cueta du O	ani Ma							10-	-1											
Custody Seals Intact: Yes No Relinquished by:	Custody S Company:	eai No.;		D-t- (Ti		-			•	oler I	emp.	°C): O	ps,q:	-		Corr'd				Therm ID No.:	
Tould I bailer	Tety	a Tecl	n	Date/Ti	. i/s,	/K	Recei	vea	by:	H,	∽∜	V.	سي	T	Somp	any.	0			Date/Time: /	
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Job Number: 160-10012-2

Client: Tetra Tech EM Inc.

List Source: TestAmerica St. Louis Login Number: 10012

List Number: 1 Creator: Clarke, Jill C

Cleator. Clarke, Sill C		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Qualifiers

Rad

MDC

MDL

ML

NC

ND PQL

QC

RER

RPD

TEF

TEQ

RL

U Result is less than the sample detection limit.

Minimum detectable concentration

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not Calculated

Quality Control

Relative error ratio

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
п	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	
160-10012-1	WAA-01-AF-PS-20141231	Filter	12/31/14 10:17	01/05/15 12:45	
160-10012-2	WAA-02-AF-PS-20141231	Filter	12/31/14 10:33	01/05/15 12:45	
160-10012-3	WAA-03-AF-PS-20141231	Filter	12/31/14 11:14	01/05/15 12:45	
160-10012-4	WAA-04-AF-PS-20141231	Filter	12/31/14 11:30	01/05/15 12:45	
160-10012-5	WAA-05-AF-PS-20141231	Filter	12/31/14 10:50	01/05/15 12:45	
160-10012-6	WAA-00-AF-FB-20141231	Filter	12/31/14 00:00	01/05/15 12:45	

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Client Tetra Tech EM Inc.

Project/Site. West Lake Landfill - Filters

TestAmerica Job ID. 160-10012-2

Lab Sample ID: 160-10012-1 Client Sample ID: WAA-01-AF-PS-20141231

Date Collected: 12/31/14 10:17

Date Received: 01/05/15 12:45

Matrix: Filter

ss Alpha / Be	ta (GFPC)								
	,	Count	Total						
		Uncert.	Uncert						
Result	Qualifier	(20+/-)	(20+/-)	ŘĹ	MDC	Unit	Prepared	Analyzed	Dil Fac
0 158	U	0.197	0.198	10.0	0.321	pCi/Sample	01/07/15 08:15	01/07/15 20 32	1
15.8		1 11	1,94	10.0	0,399	pCi/Sample	01/07/15 08:15	01/07/15 20 32	1
	Result 0.158	Result Qualifier 0.158	Count Uncert. Result Qualifier (2σ+/-) 0.158 (0, 0.197	Count Total Uncert. Uncert. Result Qualifier (20+/-) (20+/-) 0.158 U 0.197 0.198	Count Total Uncert. Uncert. Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) ŘĹ 0.158 (10.0)	Count Total Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) ŘĹ MDC 0.158 U 0.197 0.198 10.0 0.321	Count Total Uncert. Uncert. Result Qualifier (2a+/-) (2a+/-) ŘL MDC Unit 0.158 U 0.197 0.198 (0.0) 0.321 pCs/Sample	Count Total Uncert. Uncert. Uncert. Value Result Qualifier (2σ+/-) (2σ+/-) ŘĹ MDC Unit Prepared O 158 U O .197 O .198 10.0 O .321 pC//Sample O1/07/15 08:15	Count Total Uncert. Uncert. Result Qualifier (2σ+/-) (2σ+/-) Řί. MDC Unit Prepared Analyzed 0.158 U. 0.197 0.198 10.0 0.321 pC//Sample 01/07/15 08:15 01/07/15 20:32

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count	IOLAL						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2a+/-)	RL	MDC	Unit	Prepared	Analyzed	DII Fac
Cesium-137	0.0442	V	4.04	4.04	20.0	7.69	pCi/Sample	01/07/15 08:23	01/07/15 17 20	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/07/15 08:23	01/07/15 17:20	1

Client Sample ID: WAA-02-AF-PS-20141231 Lab Sample ID; 160-10012-2

Date Collected: 12/31/14 10:33 Date Received: 01/05/15 12:45

Matrix: Filter

			Count Uncert.	Total Uncert						
Analyte	Result	Qualifier	(20+/-)	(2a+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.527	7	0,287	0.293	10,0	0.326	pCi/Sample	01/07/15 08 15	01/07/15 20:33	1
Gross Beta	16.1		1.13	1.96	10.0	0.400	pCi/Sample	01/07/15 08:15	01/07/15 20 33	1
Method: GA-01-R -	Cesium-137 &	& Other Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert						

Result Qualifler $(2\sigma + l -)$ $(2\sigma + l -)$ RL MDC Unit Prepared Analyzed Dil Fac Analyte Cesium-137 0.213 4.05 4.05 20.0 7.81 pCi/Sample 01/07/15 08 23 01/07/15 17 23 Total Count Other Detected Uncert. Uncert $(2\sigma + / -)$ RL MDC Unit Prepared Analyzed Dil Fac Radionuclides Result Qualifier $(2\sigma + /-)$ 01/07/15 17 23 pCi/Sample 01/07/15 08:23 None Other Detected Radionuclide

Client Sample ID: WAA-03-AF-PS-20141231

Date Collected: 12/31/14 11:14 Date Received: 01/05/15 12:45

Lab Sample ID: 160-10012-3

Matrix: Filter

Method: 9310 - Gros	ss Alpha / Be	ta (GFPC)								
	Count	Total								
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	'SL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.251	NA VA	0.214	0 215	(10.0)	0 302	pCi/Sample	01/07/15 08 15	01/07/15 21 47	1
Gross Beta	17.7	-	1.19	2 14	10.0	0.403	pCi/Sample	01/07/15 08 15	01/07/15 21:47	1

HUE 25 Februar 2015

TestAmerica St Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Client Sample ID: WAA-03-AF-PS-20141231

Date Collected: 12/31/14 11:14 Date Received: 01/05/15 12:45

Lab Sample ID: 160-10012-3

Matrix: Filter

Method: GA-01-R - Cesium-137	8	Other Gamma	Emitters	(GS)	
------------------------------	---	-------------	----------	------	--

Metilou. GA-VI-R -	ocaldiii-107	. Other Ga	Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.75	V	4.37	4.37	20,0	7.75	pCi/Sample	01/07/15 08:23	01/07/15 17 21	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/07/15 08 23	01/07/15 17 21	1

Client Sample ID: WAA-04-AF-PS-20141231

Date Collected: 12/31/14 11:30 Date Received: 01/05/15 12:45

Lab Sample ID: 160-10012-4

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Qualit	10101						
			Uncert	Uncert						
Analyte	Result	Qualifler	(2 <i>σ+l-</i>)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.436	7	0.257	0.262	10.0	0.296	pCi/Sample	01/07/15 08:15	01/07/15 21:47	1
Gross Beta	16.3		1,15	1.99	10.0	0.405	pCi/Sample	01/07/15 08:15	01/07/15 21:47	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 0+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0 240	U	5.26	5.26	20,0	9.95	pCi/Sample	01/07/15 08 23	01/07/15 17:21	1
			Count	Total						
Other Detected			Uncert.	Uncert						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	01/07/15 08 23	01/07/15 17 21	1

Client Sample ID: WAA-05-AF-PS-20141231

Date Collected: 12/31/14 10:50 Date Received: 01/05/15 12:45 Lab Sample ID: 160-10012-5

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Oil Fac
Gross Alpha	0.392	I	0.257	0.261	10.0	0.321	pCi/Sample	01/07/15 08 15	01/07/15 21 47	1
Gross Beta	15.5		1.10	1,91	10.0	0.399	pCi/Sample	01/07/15 08 15	01/07/15 21 47	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2\sigma+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0 000	y	1.17	1 17	20.0	4 30	pCi/Sample	01/07/15 08 23	01/07/15 17 21	1

HUE 25 Feb 15

TestAmerica St. Louis

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1/15/2015

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

Client Sample ID: WAA-05-AF-PS-20141231

Date Collected: 12/31/14 10:50

Lab Sample ID: 160-10012-5

Date Received: 01/05/15 12:45

Matrix: Filter

			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None		*	ACTION AND ADDRESS OF THE ACTION OF THE ACTI			pCt/Sample	01/07/15 08 23	01/07/15 17:21	1
Radionuclide										

Client Sample ID: WAA-00-AF-FB-20141231

Lab Sample ID: 160-10012-6

Date Collected: 12/31/14 00:00 Date Received: 01/05/15 12:45

Matrix: Filter

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.207	Q.	0 213	(0.214)	10.0	0.326	pCi/Sample	01/07/15 08:15	01/07/15 21:47	1
Gross Beta	1,67	3	0.414	0,446	10.0	0.400	pCi/Sample	01/07/15 08:15	01/07/15 21 47	1
Method: GA-01-R -	Cesium-137 8	Other Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert.						
		Qualifier	(2\sigma+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte	Result	CID BITTE	1							
	-0,758		4.90	4.90	20,0	8.93	pCi/Sample	01/07/15 08:23	01/07/15 18 23	1
					20,0	8.93	pCi/Sample	01/07/15 08:23	01/07/15 18 23	1
Cesium-137			4.90	4.90	20,0	8.93	pCi/Sample	01/07/15 08:23	01/07/15 18 23	1
Cesium-137 Other Detected		U	4.90 Count	4.90 Total	20,0	8.93 MDC	, .	01/07/15 08:23	01/07/15 18-23 Analyzed	Dii Fac
Analyte Cesium-137 Other Detected Radionuclides Other Detected	-0,758	Qualifier	4.90 Count Uncert.	4.90 Total Uncert.			, .			1



Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-167105/1-A

Matrix: Filter

Analysis Batch: 167119

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 167105

			Count	i Otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.2182	U	0.199	0.200	10.0	0.285	pCi/Sample	01/07/15 08:15	01/07/15 20:31	1
Gross Beta	0.4709		0.291	0.295	10.0	0.420	pCi/Sample	01/07/15 08:15	01/07/15 20:31	1

Lab Sample ID: LCS 160-167105/2-A

Matrix: Filter

Analysis Batch: 167119

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 167105

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits 0.987 10.0 75 - 125 Gross Alpha 5.37 5.275 0.302 pCi/Samp 98

Lab Sample ID: LCSB 160-167105/3-A

Matrix: Filter

Analysis Batch: 167119

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 167105

,										
				Total						
	Spike	LCSB	LCSB	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Beta	17.9	17.72		2.14	10.0	0.405	pCi/Samp	99	75 - 125	

Lab Sample ID: 160-10012-1 DU

Matrix: Filter

Analysis Batch: 167119

Client Sample ID: WAA-01-AF-PS-20141231

Prep Type: Total/NA

Prep Batch: 167105

					Total					
	Sample	Sample	DU	DU	Uncert.					RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Gross Alpha	0.158	U	0.6726		0.312	10.0	0.285	pCi/Samp	 1.01	1
Gross Beta	15.8		15.97		1.96	10.0	0.420	pCi/Samp	0.03	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-167109/1-A

Matrix: Filter

Radionuclide

Analysis Batch: 167314

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 167109**

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.6458	U	8.98	8.98	20.0	15.7	pCi/Sample	01/07/15 08:23	01/07/15 17:23	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/07/15 08:23	01/07/15 17:23	1

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Matrix: Filter

Radionuclide

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-167109/2-A

Lab Sample ID: 160-10012-1 DU

TestAmerica Job ID: 160-10012-2

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analysis Batch: 167316									Prep Batc	:h: 1671
				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Americium-241	32000	31440		3270		120	pCi/Samp	98	87 _ 116	
Cesium-137	11100	10860		1140	20.0	78.7	pCi/Samp	98	87 _ 120	
Cobalt-60	11800	11550		1170		39.1	pCi/Samp	98	87 - 115	

Client Sample ID: WAA-01-AF-PS-20141231

Prep Type: Total/NA

Analysis Batch	: 167318								Prep E	Batch: 1	67109
-					Total				_		
	Sample	Sample	DU	DU	Uncert.						RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Cesium-137	0.0442	U	-1.423	U	6.18	20.0	11.3	pCi/Samp		0.14	1
					Total						
Other Detected	Sample	Sample	DU	DU	Uncert.						RER
Radionuclides	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Other Detected	None		None					pCi/Samr			

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10012-2

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Prep Batch: 167105

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10012-1	WAA-01-AF-PS-20141231	Total/NA	Filter	None	
160-10012-1 DU	WAA-01-AF-PS-20141231	Total/NA	Filter	None	
160-10012-2	WAA-02-AF-PS-20141231	Total/NA	Filter	None	
160-10012-3	WAA-03-AF-PS-20141231	Total/NA	Filter	None	
160-10012-4	WAA-04-AF-PS-20141231	Total/NA	Filter	None	
160-10012-5	WAA-05-AF-PS-20141231	Total/NA	Filter	None	
160-10012-6	WAA-00-AF-FB-20141231	Total/NA	Filter	None	
LCS 160-167105/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-167105/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-167105/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 167109

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10012-1	WAA-01-AF-PS-20141231	Total/NA	Filter	None	
160-10012-1 DU	WAA-01-AF-PS-20141231	Total/NA	Filter	None	
160-10012-2	WAA-02-AF-PS-20141231	Total/NA	Filter	None	
160-10012-3	WAA-03-AF-PS-20141231	Total/NA	Filter	None	
160-10012-4	WAA-04-AF-PS-20141231	Total/NA	Filter	None	
160-10012-5	WAA-05-AF-PS-20141231	Total/NA	Filter	None	
160-10012-6	WAA-00-AF-FB-20141231	Total/NA	Filter	None	
LCS 160-167109/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-167109/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J10086
Sample Numbers:	WAA-01-AF-PS-20150106, WAA-02-AF-PS-20150106, WAA-03-AF-PS-20150106, WAA-04-AF-PS-20150106, WAA-05-AF-PS-20150106, and WAA-00-AF-FB-20150106
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Interest as a second package of the summary data package.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10086 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and uranium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded low activities for one (of three) thorium isotopes and for one (of three) uranium isotopes, while the field blank yielded low activities for two thorium isotopes and one uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10086-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by: 1/29/2015 1:24:51 PM

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

.....LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10086-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Job ID: 160-10086-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10086-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 01/12/2015; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 20.0 C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150106 (160-10086-1), WAA-02-AF-PS-20150106 (160-10086-2), WAA-03-AF-PS-20150106 (160-10086-3), WAA-04-AF-PS-20150106 (160-10086-4), WAA-05-AF-PS-20150106 (160-10086-5) and WAA-00-AF-FB-20150106 (160-10086-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 01/21/2015 and analyzed on 01/26/2015 and 01/27/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150106 (160-10086-1), WAA-02-AF-PS-20150106 (160-10086-2), WAA-03-AF-PS-20150106 (160-10086-3), WAA-04-AF-PS-20150106 (160-10086-4), WAA-05-AF-PS-20150106 (160-10086-5) and WAA-00-AF-FB-20150106 (160-10086-6) were

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Job ID: 160-10086-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/19/2015 and analyzed on 01/26/2015.

No additional analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150106 (160-10086-1), WAA-02-AF-PS-20150106 (160-10086-2), WAA-03-AF-PS-20150106 (160-10086-3), WAA-04-AF-PS-20150106 (160-10086-4), WAA-05-AF-PS-20150106 (160-10086-5) and WAA-00-AF-FB-20150106 (160-10086-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/19/2015 and analyzed on 01/23/2015.

No additional analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record

THE LEADER IN ENVIRONMENTAL TESTING

Farth City MO 63045

phone 314.298.8566 fax	Regu	latory Pro	gram:] wo [NPDES	Г	RCR	A	По	Other:										TestAmerica Laboratories, Inc.
Client Contact			ave Kinrot				_			ve Ki	inroth		Ins	te: 1-	12-1	5				COC No:
Tetra Tech, Inc.		314-517-67									_	rrier:								
415 Oak Street		Analysis T	urnaround	Time		T	T				1		- 100	T T	1	7	1	Т		1 of1 COCs
Kansas City, MO 64106	CALEN	DAR DAYS	√ WOR	KING DAY	S										1					Sampler:
(816) 412-1786 Phone		if different fro		20		ĺ	:						1			1				For Lab Use Only:
(816) 816-410-1748 FAX			weeks		-	IşE			Ę	ء اء	(GFPC)	- 1	l							Walk-in Client:
Project Name: West Lake Landfill Site			week			519	ğ.	Spec	adjr		9	1								Lab Sampling:
Site: Bridgeton, MO	1 🗄		days				pa/	တ္	аК	본불	28									
PO# 1105610	1 🗇		day			힐	謈	Gamm	h	8 8	₹ ਵ					İ				Job / SDG No.:
			Sample			Sar	88	ပ်	al∤	of of	gi		Ì		İ	ĺ				
Sample Identification	Sample Date	Sample Time	Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N) Perform MS / MSD (Y/	9310 Gr	GA-01-R	9315 Total Alpha Radium	A-01-R Isotopic Thorium A-01-R Isotopic Uranium	* 9315 Radium-226									Sample Specific Notes:
WAA-01-AF-PS-20150106	1/6/15	14:28	Filter	Air	1		Х	Х		ХX	\top		1	Ħ	十	1	T	廿		
WAA-02-AF-PS-20150106	1/6/15	14:45	Filter	Air	1	H	X	Х		X X			+	$\dagger \dagger$	+	+	\vdash	+	+	* 9315 Radium-226 (GFPC) contingent upon TAR results
WAA-03-AF-PS-20150106	1/6/15	15:15				H						\dashv	+	H	+	+-	H	╁╌┼	+	
WAA-04-AF-PS-20150106	 		Filter	Air	1	H	Х			××	\top	+	+	++	+	+	╀	\vdash	+	for all samples
	1/6/15	15:30	Filter	Air	1	\vdash	Х	Х	\neg	X X	X	_	_	╀	+	+-	╀-	\vdash		
WAA-05-AF-PS-20150106	1/6/15	15:00	Filter	Air	11		Х	X	X	XX	X		_				1	\sqcup		
WAA-00-AF-FB-20150106	1/6/15	NA	Filter	Air	1		Х	х	Х	x x	(x				\perp					
\$																				
															160	0-100	086 (Chain	of Cu	stody
														\prod	I	Ī	l	Ι Ι	1	
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5-Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please Comments Section if the lab is to dispose of the sample.			odes for the	sample	in the	S	ampl	le Di	spo	sal (/	A fee	may	be as	sess	ed if	samp	ples	are r	etaine	ed longer than 1 month)
Non-Hazard Flammable Skin Initant	Poison	В	Unkno	٧n		7	□R	etum	to C	lient			Dispos	al by La	ab			Archive	for	Months
Special Instructions/QC Requirements & Comments:													1							
							,				_									
Custody Seals Intact: Yes No	Custody S	eal No.:								ler Te	mp. ((c): 0	bs'd:_			Corr'd	d:		1	herm ID No.:
Relinquished by: Tam Assaul	Company:	a Tec	V	Date/Tir	ne: 15 15	IS R	K)	edis	y./	7	سد				Comp	any:		 (, , , , ,	Date/Time: 15/5
Relinquished by:	Company:			Date/Tir			eceiv			\rightarrow	A				Comp					Date/Time:
Relinquished by:	Company:			Date/Tir	ne:	R	eceiv	ed ir	n Lai	borato	ory by				Comp	any:				Date/Time:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Client: Tetra Tech EM Inc. Job Number: 160-10086-1

Login Number: 10086 List Source: TestAmerica St. Louis

List Number: 1

Creator: Daniels, Brian J

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10086-1

Qualifiers

Rad

ND PQL

QC

RL

RER

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
n	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10086-1	WAA-01-AF-PS-20150106	Filter	01/06/15 14:28	01/12/15 15:15
160-10086-2	WAA-02-AF-PS-20150106	Filter	01/06/15 14:45	01/12/15 15:15
160-10086-3	WAA-03-AF-PS-20150106	Filter	01/06/15 15:15	01/12/15 15:15
160-10086-4	WAA-04-AF-PS-20150106	Filter	01/06/15 15:30	01/12/15 15:15
160-10086-5	WAA-05-AF-PS-20150106	Filter	01/06/15 15:00	01/12/15 15:15
160-10086-6	WAA-00-AF-FB-20150106	Filter	01/06/15 00:00	01/12/15 15:15

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Client: Tetra Tech EM Inc.

Project/Site, West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Client Sample ID: WAA-01-AF-PS-20150106

Date Collected: 01/06/15 14:28 Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-1

Matrix: Filter

Analyte	Result	Qualifier	Count Uncert (2σ+/-)	Total Uncert. (20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,498	W	0.470	0.472	1.00	0.732	pCi/Sample	01/21/15 09 46	01/26/15 20 08	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carner	101		40 - 110					01/21/15 09 46	01/26/15 20:08	1
Method: A-01-R - Iso	topic Thoriu	ım (Alpha S	pectrometry)							
			Count	Total						

		Uncert,	Uncert.						
Analyte	Result Qualifier	(2σ+ <i>l</i> -)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	-0.00666 🔰	0.127	0.127	1.00	0.268	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
Thorium-230	0.315	0,161	0,164	1,00	0.138	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
Thonum-232	0.0186	0.0373	0.0373	1.00)	0.0559	pCi/Sample	01/19/15 14 10	01/26/15 08:53	1
Tracer	%Yield Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	92.5	30 - 110					01/19/15 14.10	01/26/15 08 53	1

les alles										
Method: A-01-R - Iso	otopić Uraniu	ım (Alpha S	pectrometry Count Uncert.) Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.182	7	0.128	0.129	1.00	0.131	pCi/Sample	01/19/15 14 10	01/23/15 11 28	1
Uranium-235/236	0,0247	y	0,0495	0,0495	1.00	0,0742	pCi/Sample	01/19/15 14 10	01/23/15 11:28	1
Uranium-238	0,0198	on	0.0397	0.0397	1.00	0.0595	pCi/Sample	01/19/15 14:10	01/23/15 11 28	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dit Fac
Uranium-232	86.1		30 - 110					01/19/15 14:10	01/23/15 11:28	1

Client Sample ID: WAA-02-AF-PS-20150106

Date Collected: 01/06/15 14:45

Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-2

Matrix: Filter

			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0 220	EN.	0.427	0.428	1.00	0.758	pCi/Sample	01/21/15 09:46	01/26/15 20 08	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.5		40-110					01/21/15 09.46	01/26/15 20 08	1

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0,0531		0.166	0.166	1.00	0.330	pCi/Sample	01/19/15 14 10	01/26/15 08:53	1
Thorium-230	0,561)	0.264	0.268	1.00	0.166	pCi/Sample	01/19/15 14 10	01/26/15 08 53	1
Thorium-232	0,000	u	0,0249	0.0249	(1.00)	0.0897	pCi/Sample	01/19/15 14 10	01/26/15 08 53	1

HUE 25 February 2015

TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Client Sample ID: WAA-02-AF-PS-20150106

Date Collected: 01/06/15 14:45 Date Received: 01/12/15 15:15 Lab Sample ID: 160-10086-2

Matrix: Filter

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	58.7		30 - 110					01/19/15 14:10	01/26/15 08:53	1
Method: A-01-R - Is	otopic Uraniu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+1-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0910	W	0.0904	0.0907	1.00	0.110	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1
Uranium-235/236	0.0494	U	0.0699	0.0700	100	0.0742	pCi/Sample	01/19/15 14:10	01/23/15 11 28	1
Uranium-238	0.0991	7	0,0887	0.0890	1.00	0.0595	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	85,2		30 - 110					01/19/15 14 10	01/23/15 11 28	1

Client Sample ID: WAA-03-AF-PS-20150106

Date Collected: 01/06/15 15:15

Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-3

Matrix: Filter

			Count	Totat						
			Uncert.	Uncert		-				
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MD¢	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,0271	art	0.464	0.464	1.00	0.889	pCi/Sample	01/21/15 09:46	01/26/15 20:08	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					01/21/15 09:46	01/26/15 20 08	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry))						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.216	7	0.161	0.162	1.00	0.207	pCi/Sample	01/19/15 14 10	01/26/15 09:53	1
Thorium-230	0,449	1	0,195	0.200	1.00	0.0642	pCi/Sample	01/19/15 14:10	01/26/15 08 53	1
Thonum-232	0,0248	U	0.0653	0.0653	1.00	0.140	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	81.9		30 - 110					01/19/15 14 10	01/26/15 08 53	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.126	J	0.103	0.103	1.00	0.106	pCi/Sample	01/19/15 14:10	01/23/15 11 28	1
Uranium-235/236	0.0139	U/	0.0517	0 0517	1.00	0.132	pCi/Sample	01/19/15 14 10	01/23/15 11 28	1
Uranium-238	0 0606	4	0.0799	0.0800	1.00	0_126	pCi/Sample	01/19/15 14 10	01/23/15 11 28	1
_	0/ N:-1-1	Qualifier	Limits					Prepared	Analyzed	Dit Fac
Tracer	29 A181Q	Qualifier	Limits					Lichaten	Milalyzeo	Dir e de

HUG 25 Pet 15

Client Tetra Tech EM Inc.

Analyte

Tracer

Thorium-228

Thorium-230

Thorium-232

Thorium-229

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Client Sample ID: WAA-04-AF-PS-20150106

Date Collected: 01/06/15 15:30 Date Received: 01/12/15 15:15 Lab Sample ID: 160-10086-4

Matrix: Filter

			Count	Total						
Analyte	Popult	Qualifier	Uncert. (20+/-)	Uncert. (20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Total Alpha Radium	0.900	Qualifier	0.599	0.605	(1.00)		pCi/Sample	01/21/15 09.46	01/27/15 07 04	DII F8
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Oil Fa
Ba Carrier	97.1		40 - 110					01/21/15 09:46	01/27/15 07 04	
Method: A-01-R - Isoto	opic Thoriu	m (Alpha S	Spectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Thorium-228	-,	u ()	0.129	0.129	1.00	0.254	pCi/Sample	01/19/15 14 10	01/26/15 08:53	
Thorium-230	0.354	7	0.176	0.178	1,00	0.147	pCi/Sample	01/19/15 14 10	01/26/15 08:53	
Thorium-232	0,0708	u q	0.0808	0.0810	1.00	0,109	pCi/Sample	01/19/15 14:10	01/26/15 08:53	
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Thorium-229	86 1		30 - 110					01/19/15 14:10	01/26/15 08 53	
Analyte	Posult	Qualifier	Uncert. (2σ+/-)	Uncert. (2a+/-)	RL	MDC	Unit	Prepared	Analyzed	Di) Fa
Attatyte	Life a mil									
Uranium-233/234		W	0.0997	0,100	1.00	0.121	pCi/Sample	01/19/15 14:10	01/23/15 11:28	
The same of the sa	0.113 0.0362		0.0997 0.0675	0,100 0.0676	1.00	0.121 0.127	pCi/Sample pCi/Sample	01/19/15 14:10 01/19/15 14:10	01/23/15 11:28 01/23/15 11:28	
Uranium-233/234	0.113	J.		-,	1					
Uranium-233/234 Uranium-235/236	0.113 0.0362	W.	0.0675	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10	01/23/15 11 28 01/23/15 11 28	
Uranium-233/234 Uranium-235/236 Uranium-238	0.113 0.0362 0.0444	W.	0.0875 0 ₁ 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10	01/23/15 11:28	Dil Fac
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232	0.113 0.0362 0.0444 % Yield 94.8	Qualifier	0.0875 0.110 <i>Limits</i> 30 - 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232	0.113 0.0362 0.0444 %Yield 94.8	Qualifier	0.0875 0.110 <i>Limits</i> 30 - 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00	Qualifier	0.0875 0.110 <i>Limits</i> 30 - 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fac
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Voate Collected: 01/06/10 Date Received: 01/12/1	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00 5 15:15	Qualifier F-P\$-201	0.0875 0.110 <i>Limits</i> 30 - 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Volate Gollected: 01/06/1	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00 5 15:15	Qualifier F-P\$-201	0.0875 0.110 <i>Limits</i> 30 - 110	0.0676	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Voate Collected: 01/06/10 Date Received: 01/12/1	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00 5 15:15	Qualifier F-P\$-201	0.0875 0.110 Limits 30.110 50106	0.0676 0.110	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fac
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Vote Collected: 01/06/10ate Received: 01/12/1	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00 5 15:15	Qualifier F-P\$-201	0.0875 0.110 <i>Limits</i> 30 - 110 50106	0.0676 0.110	1.00	0.127	pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14 10	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1	Dil Fa
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Vote Collected: 01/06/10 Date Received: 01/12/11 Method: 9315 - Total /	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5 15:00 5 15:15	Qualifier F-PS-201	0.0875 0.110 Limits 30 - 110 50106	0.0676 0.110 Total Uncert.	1.00	0.127	pCi/Sample pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14:10 Lab Sam	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1 Matri	Dil Fa 0086-{ x; Filte
Uranium-233/234 Uranium-235/236 Uranium-238 Tracer Uranium-232 Client Sample ID: Voate Collected: 01/06/1 Oate Received: 01/12/1 Method: 9315 - Total /	0.113 0.0362 0.0444 %Yield 94.8 VAA-05-A 5.15:00 5.15:15 Apha Radiu Result 0.465	Qualifier F-PS-201 Im (GFPC) Qualifier	0.0875 0,110 Limits 30 - 110 50106 Count Uncert. (20+i-)	0.0676 0.110 Total Uncert. (20+/-)	1.00 1.00	0.127 0.209	pCi/Sample pCi/Sample	01/19/15 14 10 01/19/15 14 10 Prepared 01/19/15 14:10 Lab Sam	01/23/15 11:28 01/23/15 11:28 Analyzed 01/23/15 11:28 ple ID: 160-1 Matri	Dil Fa 0086-{ x: Filte

30.110 UE 25 Feb 15

Uncert.

 $(2\sigma + I -)$

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RL

1.00

1.00

1.00

MDC Unit

0.237 pCi/Sample

0 180 pCi/Sample

0.122 pCi/Sample

Prepared

01/19/15 14:10

01/19/15 14:10

01/19/15 14:10

Prepared

01/19/15 14 10

Uncert.

(20+/-)

0.115

0.154

0.0429

Limits

Result Qualifler

%Yield Qualifier

0.0139 VA

0.00308

921

0.242

TestAmerica St Louis

Analyzed

01/26/15 08:53

01/26/15 08 53

01/26/15 08 53

Analyzed

01/26/15 08 53

Dil Fac

Dil Fac

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Client Sample ID: WAA-05-AF-PS-20150106

Date Collected: 01/06/15 15:00 Date Received: 01/12/15 15:15 Lab Sample ID: 160-10086-5

Matrix: Filter

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(2 0+/-)	(2 <i>a</i> +/-)	RL	MDC	Unit	Prepared	Analyzed	Dit Fac
Uranium-233/234	0.0960	4	0.103	0.103	1.00	0.149	pCi/Sample	01/19/15 14 10	01/23/15 11 28	1
Uranium-235/236	0.0398	w	0.0741	0.0742	1.00	0.139	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1
Uranium-238	-0.0151	U	0.0861	0.0861	1.00	0.213	pCi/Sample	01/19/15 14 10	01/23/15 11 28	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	87.6		30 - 110					01/19/15 14:10	01/23/15 11:28	1

Client Sample ID: WAA-00-AF-FB-20150106

Date Collected: 01/06/15 00:00

Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-6

Matrix: Filter

Analyte	Result	Qualifier	Count Uncert (2 <i>σ+l-</i>)	Total Uncert (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dit Fac
Total Alpha Radium	-0.219	W	0.456	0.457	1.00	0.956	pCi/Sample	01/21/15 09 46	01/27/15 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.5		40 - 110					01/21/15 09 46	01/27/15 07:04	1
Method: A-01-R - iso	topic Thoriu	ım (Alpha S	pectrometry)	l						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(2 0+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.108	(u	0.123	0,124	(1.00)	0.195	pCi/Sample	01/19/15 14:10	01/26/15 08 53	1
1110110111-228	0, 100		0.720	-,			P C " C C II II I	4 4. 14 . 14 . 4	Q E B B	

1
1
1
Dil Fac
1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) Count Total Uncert. Uncert. Result Qualifier $(2\sigma + l - l)$ Analyte $(2\sigma + l -)$ MDC Unit Prepared Analyzed Dil Fec Uranium-233/234 0.0400 0.0676 0.0677 1.00 0.121 pCi/Sample 01/19/15 14 10 01/23/15 11:28 Uranium-235/236 0.0230 0.0460 0.0460 1,00 0.0690 pCi/Sample 01/19/15 14:10 01/23/15 11:28 1 Uranium-238 0.140 0.105 0.106 0,102 pCi/Sample 01/19/15 14 10 01/23/15 11 28 1 Tracer **%Yield Qualifier** Limits Prepared Analyzed Dii Fac Uranium-232 95.3 30 - 110 01/19/15 14 10 01/23/15 11 28

HUE 75 Feb 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-169561/1-A

Matrix: Filter

Analysis Batch: 170161

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 169561

Analyzed

01/26/15 20:08

			Count	i Otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.5100	U	0.578	0.580	1.00	0.944	pCi/Sample	01/21/15 09:46	01/26/15 20:08	1

MB MB

Carrier %Yield Qualifier Limits Ba Carrier 95.9 40 - 110

Prepared

01/21/15 09:46

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 169561**

Lab Sample ID: LCS 160-169561/2-A

Matrix: Filter

Analysis Batch: 170161

				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Total Alpha	45.0	44.35		5.03	1.00	1.20	pCi/Samp	99	65 - 150	

Radium

LCS LCS

Carrier %Yield Qualifier Ba Carrier 40 - 110 85.3

Lab Sample ID: LCSD 160-169561/3-A

Matrix: Filter

Analysis Batch: 170161

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 169561

				Total							
	Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Total Alpha	45.0	49.15		5.38	1.00	0.899	pCi/Samp	109	65 - 150	0.46	1

Radium

LCSD LCSD

Carrier %Yield Qualifier Limits Ba Carrier 95.3 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

89.9

Lab Sample ID: MB 160-169196/1-A

Matrix: Filter

Thorium-229

Analysis Batch: 170442

Client	Sampl	a ID:	Mathod	Rlank

01/26/15 08:53

01/19/15 14:10

Prep Type: Total/NA

Prep Batch: 169196

			Count	Total					•	
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.07470	U	0.100	0.100	1.00	0.165	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
Thorium-230	0.4838		0.201	0.205	1.00	0.154	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
Thorium-232	-0.007912	U	0.0158	0.0158	1.00	0.105	pCi/Sample	01/19/15 14:10	01/26/15 08:53	1
	MB	MB								
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

30 - 110

TestAmerica St. Louis

Dil Fac

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-169196/2-A

Matrix: Filter

Analysis Batch: 170468

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 169196

Total LCS LCS %Rec. Spike Uncert. Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 1.00 16.1 15.51 1.68 0.165 pCi/Samp 81 - 118

LCS LCS

Tracer %Yield Qualifier I imits Thorium-229 97.8 30 - 110

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 169196

Lab Sample ID: LCSD 160-169196/3-A

Matrix: Filter

Analysis Batch: 170469

Total LCSD LCSD RER Spike Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit 0.188 pCi/Samr Thorium-230 16.1 2.07 1.00 18 94 118 81 - 118 0.91

LCSD LCSD

Tracer %Yield Qualifier Limits Thorium-229 30 - 110 71.7

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-169197/1-A

Matrix: Filter

Matrix: Filter

Analysis Batch: 170110

Analysis Batch: 170109

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 169197

			Count	i otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.08414		0.0841	0.0844	1.00	0.0631	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1
Uranium-235/236	0.0000	U	0.0218	0.0218	1.00	0.0785	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1
Uranium-238	0.06298	U	0.0727	0.0729	1.00	0.0630	pCi/Sample	01/19/15 14:10	01/23/15 11:28	1

MR MR

Lab Sample ID: LCS 160-169197/2-A

Qualifier Tracer %Yield Limits 30 - 110 Uranium-232 82 7

01/23/15 11:28 01/19/15 14:10

82 - 122

Analyzed

Client Sample ID: Lab Control Sample

Prepared

114

Prep Type: Total/NA

Dil Fac

Prep Batch: 169197

Total

26.0

Spike LCS LCS Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits Uranium-233/23 25.5 27.81 2.81 1.00 0.161 pCi/Samp 109 84 - 120 Uranium-238

29.63

LCS LCS

%Yield Qualifier Limits Tracer Uranium-232 78.4 30 - 110

TestAmerica St. Louis

2.96

1.00

0.121 pCi/Samp

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCSD 160-169197/3-A

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

TestAmerica Job ID: 160-10086-1

Client Sample ID: Lab Control Sample Dup

ipie ib. Lab contitoi campie	Dup
Prep Type: Tota	I/NA
Prep Batch: 169	9197

Analysis Batcl	h: 170111										Prep B	atch: 1	69197
						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23	-		25.5	23.34		2.39	1.00	0.0600	pCi/Samp	92	84 - 120	0.86	1
4													
Uranium-238			26.0	25.61		2.58	1.00	0.0599	pCi/Samp	98	82 _ 122	0.72	1
	LCSD	LCSD											
Tracer	%Yield	Qualifier	Limits										
Uranium-232	85.8		30 - 110										
<u> </u>													

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-1

Rad

Prep Batch: 169196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10086-1	WAA-01-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-2	WAA-02-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-3	WAA-03-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-4	WAA-04-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-5	WAA-05-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-6	WAA-00-AF-FB-20150106	Total/NA	Filter	ExtChrom	
LCS 160-169196/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-169196/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-169196/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 169197

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10086-1	WAA-01-AF-PS-20150106	Total/NA	Filter	ExtChrom	_
160-10086-2	WAA-02-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-3	WAA-03-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-4	WAA-04-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-5	WAA-05-AF-PS-20150106	Total/NA	Filter	ExtChrom	
160-10086-6	WAA-00-AF-FB-20150106	Total/NA	Filter	ExtChrom	
LCS 160-169197/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-169197/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-169197/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 169561

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10086-1	WAA-01-AF-PS-20150106	Total/NA	Filter	DPS-0	_
160-10086-2	WAA-02-AF-PS-20150106	Total/NA	Filter	DPS-0	
160-10086-3	WAA-03-AF-PS-20150106	Total/NA	Filter	DPS-0	
160-10086-4	WAA-04-AF-PS-20150106	Total/NA	Filter	DPS-0	
160-10086-5	WAA-05-AF-PS-20150106	Total/NA	Filter	DPS-0	
160-10086-6	WAA-00-AF-FB-20150106	Total/NA	Filter	DPS-0	
LCS 160-169561/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-169561/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-169561/1-A	Method Blank	Total/NA	Filter	DPS-0	

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TestAmerica Job ID: 160-10086-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10086-1	WAA-01-AF-PS-20150106	101	
160-10086-2	WAA-02-AF-PS-20150106	98.5	
160-10086-3	WAA-03-AF-PS-20150106	101	
160-10086-4	WAA-04-AF-PS-20150106	97.1	
160-10086-5	WAA-05-AF-PS-20150106	99.4	
160-10086-6	WAA-00-AF-FB-20150106	98.5	
CS 160-169561/2-A	Lab Control Sample	85.3	
_CSD 160-169561/3-A	Lab Control Sample Dup	95.3	
MB 160-169561/1-A	Method Blank	95.9	
Tracer/Carrier Legend			
er/Carrier Legend Ba Carrier			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

watrix: Filter			Prep Type: Total/NA
-			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10086-1	WAA-01-AF-PS-20150106	92.5	
160-10086-2	WAA-02-AF-PS-20150106	58.7	
160-10086-3	WAA-03-AF-PS-20150106	81.9	
160-10086-4	WAA-04-AF-PS-20150106	86.1	
160-10086-5	WAA-05-AF-PS-20150106	92.1	
160-10086-6	WAA-00-AF-FB-20150106	88.0	
LCS 160-169196/2-A	Lab Control Sample	97.8	
LCSD 160-169196/3-A	Lab Control Sample Dup	71.7	
MB 160-169196/1-A	Method Blank	89.9	
Tracer/Carrier Legend			
Th-229 = Thorium-229			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10086-1	WAA-01-AF-PS-20150106	86.1	
160-10086-2	WAA-02-AF-PS-20150106	85.2	
160-10086-3	WAA-03-AF-PS-20150106	91.9	
160-10086-4	WAA-04-AF-PS-20150106	94.8	
160-10086-5	WAA-05-AF-PS-20150106	87.6	
160-10086-6	WAA-00-AF-FB-20150106	95.3	
LCS 160-169197/2-A	Lab Control Sample	78.4	
LCSD 160-169197/3-A	Lab Control Sample Dup	85.8	
MB 160-169197/1-A	Method Blank	82.7	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J10086
Sample Numbers:	WAA-01-AF-PS-20150106, WAA-02-AF-PS-20150106, WAA-03-AF-PS-20150106, WAA-04-AF-PS-20150106, WAA-05-AF-PS-20150106, and WAA-00-AF-FB-20150106
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
The data were qualified according to the U.S. Environmental Protection Agency (EPA) Region 7 documents entitled "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review" (9240.1-48), June 2008. In addition, the Tetra Tech document "Review of Data Packages from Subcontracted Laboratories" (February 2002) and the EPA and others document "Multi-Agency Radiological Laboratory Analytical Protocols Manual" (July 2004) were used along with other writeria specified in the applicable methods. The review was intended to identify problems and quality control (QC) deficiencies that were readily upparent from the summary data package. The following sections discuss any problems or deficiencies hat were found, and data qualifications applied because of non-compliant QC. The data review was imited to the available field and laboratory QC information submitted with the project-specific data backage. Harry Ellis, certify that all data validation criteria outlined in the above-referenced documents were assessed, and any qualifications made to the data accorded with those documents.	
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10086 included five (5) environmental air (filter) samples and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded a low gross beta activity and the field blank a somewhat higher beta activity. The other field samples yielded approximately 10 times the field blank beta activity, so no further qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10086-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

al.

Authorized for release by: 1/20/2015 10:39:54 AM

Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

.....LINKS

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Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10086-2

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Job ID: 160-10086-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10086-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 1/12/2015 3:15 PM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 20.0° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-01-AF-PS-20150106 (160-10086-1), WAA-02-AF-PS-20150106 (160-10086-2), WAA-03-AF-PS-20150106 (160-10086-3), WAA-04-AF-PS-20150106 (160-10086-4), WAA-05-AF-PS-20150106 (160-10086-5) and WAA-00-AF-FB-20150106 (160-10086-6) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared on 01/15/2015 and analyzed on 01/16/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-01-AF-PS-20150106 (160-10086-1), WAA-02-AF-PS-20150106 (160-10086-2), WAA-03-AF-PS-20150106 (160-10086-3), WAA-04-AF-PS-20150106 (160-10086-4), WAA-05-AF-PS-20150106 (160-10086-5) and WAA-00-AF-FB-20150106 (160-10086-6) were

TestAmerica St. Louis 1/20/2015

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Job ID: 160-10086-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared on 01/15/2015 and analyzed on 01/16/2015 and 01/18/2015.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

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TestAmerica St. Louis

13715 Rider Trail North

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Earth City, MO 63045

phone 314.298.8566 fax	Regu	latory Pro	gram: [DW	NPDES	; r	RCF	RS.	П	Other:											TestAmerica Lab	oratorios Inc
Client Contact			ave Kinrot	_		*					(inrot	3	Ir	Date: 1-12-15						COC No:	oratories, inc.	
Tetra Tech, Inc.	Tel/Fax:	314-517-67	'98								ranks			Carrier: NA						1 of 1	000	
415 Oak Street			urnaround	Time		İΤ	T	T	T		1	П	+	Carrer. NA							_ COCs	
Kansas City, MO 64106	☐ CALEN			KING DAY	S	11	1									- 1		ŀ			Sampler:	
(816) 412-1786 Phone		if different fro		20		;										- 1		1			For Lab Use Only:	1
(816) 816-410-1748 FAX			weeks		-	_ -	-		١ౖ	ا ء ا	= [유		- 1	-				Į	-		Walk-in Client:	
Project Name: West Lake Landfill Site			week			1513	eg	8	혍	┋.	[b]		- [-				- -	.		Lab Sampling:	
Site: Bridgeton, MO	i		days				ak B	တီ	50	욑	2 2					1						
PO# 1105610	1 🛱		day			활	9	Gamm Spec	효	용 .	8 4					İ			-		Job / SDG No.:	
			Sample	_		Sar	88	g	al A	용				- 1		İ						
Sample Identification	Sample Date	Sample Time	Type (C=Comp, G=Grab)	Matrix	# of Cont	Filtered Sample (Y/N)	9310 Gro	GA-01-R	9315 Total Alpha Radium	A-01-R Isotopic Thorium	A-U1-K isotopic Uranium * 9315 Radium-226 (GFPC)										Sample Speci	fic Notes
WAA-01-AF-PS-20150106	1/6/15	14:28	Filter	Air	1	П	Х	Х	Х	x :	x x				Ħ		T	T	1		* 9315 Radium-226 (
WAA-02-AF-PS-20150106	1/6/15	14:45	Filter	Air	1	П	X	х	х		хx			\top	\Box		\top		1		contingent upon TAR	
WAA-03-AF-PS-20150106	1/6/15	15:15	Filter	Air	1	П	х	х			хx		丁				\top	1	1	†	for all samples	
WAA-04-AF-PS-20150106	1/6/15	15:30	Filter	Air	1	П	X	х	х		x x	П		\top	\Box		\top		1			
WAA-05-AF-PS-20150106	1/6/15	15:00	Filter	Air	1	П	X	х	Х	x ;	хx						1	\top	T			
WAA-00-AF-FB-20150106	1/6/15	NA	Filter	Air	1	П	Х	х	х		x x		\dashv			十			1			
							1				\top		\top	十	 		101160	L C1106 KI	, Lat 11 46)			·
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							1								11	60-10	JUBE	CIR	2111 0	Out	iouy	
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				ļ		┢	╂						_		\sqcup				<u> </u>			
							l						1	-		ĺ	-					
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=	NaOH; 6=	Other											an 1						0 800			
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please to Comments Section if the lab is to dispose of the sample.	ist any EP	A Waste Co	odes for the	sample	in the	s	amp	le D	ispo	osal (A fee	may	/ be a	sses	sed i	f sar	nple	es ar	e ret	taine	d longer than 1 mon	th)
Non-Hazard Flammable Skin Irritant	Poison	В	Unkno	wn			□F	Returr	to C	lient		Г	Dispo	sal by	Lab		E	Arc	hive fo	or	Months	
Special Instructions/QC Requirements & Comments:													-					-				
							•															
Custody Seals Intact: Yes No	Custody S	eal No							Cor	der V	émp. (%C]- €	Ohs'd			Cor	r'd:			T	nerm ID No.:	
			į .	Date/Ti	me. ÷c	- 1 d R	eest	red'		1	p. (1	- D3 U		Com	pany					Date/Time:	
Relinquished by: Tank Abank	Company:		V	Date/Ti						7/		6						(1.12-15 /	515
Relinquished by:	Company:		.*	Date/Tir	me:	R	ecei\	/ed k	oy:	1	71				Com	pany	<i>f</i> :				Date/Time;	
Relinquished by:	Company:			Date/Ti	me:	R	eceiv	∕ed i	n La	borat	ory by	r.			Com	ipany	/:				Date/Time:	· ()

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013







Login Sample Receipt Checklist

Client: Tetra Tech EM Inc. Job Number: 160-10086-2

Login Number: 10086 List Source: TestAmerica St. Louis

List Number: 1

Creator: Daniels, Brian J

3.00.0		
Question	Answer Comment	
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Minimum Level (Dioxin)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Not Calculated

Quality Control Relative error ratio TestAmerica Job ID: 160-10086-2

Qualifiers

Rad

ML

NC

ND PQL

QC

RER RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Cioosary	
Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10086-1	WAA-01-AF-PS-20150106	Filter	01/06/15 14:28	01/12/15 15:15
160-10086-2	WAA-02-AF-PS-20150106	Filter	01/06/15 14:45	01/12/15 15:15
160-10086-3	WAA-03-AF-PS-20150106	Filter	01/06/15 15:15	01/12/15 15:15
160-10086-4	WAA-04-AF-PS-20150106	Filter	01/06/15 15:30	01/12/15 15:15
160-10086-5	WAA-05-AF-PS-20150106	Filter	01/06/15 15:00	01/12/15 15:15
160-10086-6	WAA-00-AF-FB-20150106	Filter	01/06/15 00:00	01/12/15 15:15

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Client Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Client Sample ID: WAA-01-AF-PS-20150106 Lab Sample ID: 160-10086-1

Date Collected: 01/06/15 14:28 Date Received: 01/12/15 15:15

Matrix: Filter

Method: 9310 - Gros	s Alpha / Be	ta (GFPC)								
			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.489	7	0.304	0,310	10.0	0.385	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1
Gross Beta	12.3		0 979	1.57	10.0	0.371	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1

Gross Beta	12.3		0 979	1.57	10.0	0,371	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1
Method: GA-01-R -	Cesium-137 8	Other Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.794	M	5.87	5.87	20.0	10,8	pCi/Sample	01/15/15 14 46	01/16/15 12:47	1
			Count	Total						
Other Detected			UncerL	Uncert.						
Radionuclides	Resuit	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/15/15 14:46	01/16/15 12.47	1
Radionuclide										

Lab Sample ID: 160-10086-2 Client Sample ID: WAA-02-AF-PS-20150106

Date Collected: 01/06/15 14:45

Matrix. Filter

Date Received: 01/12/15 15:15

Method: 9310 - Gross	Alpha / Be	ta (GFPC)								
			Count UncerL	Total UncerL						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.513	7	0.282	0.288	10.0	0,329	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1
Gross Beta	12,4		1,00	1,59	10.0	0 423	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1
Method: GA-01-R - Ce	sium-137 8	d Other Gam	ma Emitters	(GS)						
			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-1 21	W	6.19	6.19	20,0	11.4	pCl/Sample	01/15/15 14-46	01/16/15 12 48	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None			•			pCi/Sample	01/15/15 14 46	01/16/15 12 48	1

Lab Sample ID: 160-10086-3 Client Sample ID: WAA-03-AF-PS-20150106

Date Collected: 01/06/15 15:15 Date Received: 01/12/15 15:15 Matrix: Filter

			Count	Total						
			Uncert.	UncerL						
Analyte	Result	Qualifier	(2σ+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0,424	3	0 284	0.288	10.0	0.384	pCi/Sample	01/15/15 14 36	01/16/15 09 28	1
Gross Beta	16.9		1_16	2.05	10 0	0.412	pCi/Sample	01/15/15 14.36	01/16/15 09 28	1

HV€ 25 Februar 2015

TestAmerica St Louis

Client, Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TeslAmerica Job ID: 160-10086-2

Client Sample ID: WAA-03-AF-PS-20150106

Lab Sample ID: 160-10086-3

Date Collected: 01/06/15 15:15 Date Received: 01/12/15 15;15

Matrix: Filter

Method: GA-01-R - Cesium-137 & Other Gamma	Emitters (GS)
	Count	To

			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-2.72	U	14 8	14 8	20.0	14 2	pCi/Sample	01/15/15 14 46	01/16/15 12:52	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+h)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Olher Detected	None						pCi/Sample	01/15/15 14:46	01/16/15 12:52	1
Radionuclide										

Client Sample ID: WAA-04-AF-PS-20150106

Date Collected: 01/06/15 15:30 Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-4

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.770	7	0.325	0 336	10.0	0.316	pCi/Sample	01/15/15 14:36	01/16/15 09:29	1
Gross Beta	15,8		1,11	1,93	10.0	0.354	pCi/Sample	01/15/15 14:36	01/16/15 09:29	1

Wethod: GA-01-R -			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dij Fac
Cesium-137	0.864	e	4.67	4.67	20,0	8.64	pCi/Sample	01/15/15 14.46	01/16/15 12 51	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualitier	(20+/-)	(2σ+ /)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	01/15/15 14 46	01/16/15 12 51	1

Client Sample ID: WAA-05-AF-PS-20150106

Date Collected: 01/06/15 15:00 Date Received: 01/12/15 15:15

Lab Sample ID: 160-10086-5

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.584	7	0.277	0.285	10.0	0.272	pCi/Sample	01/15/15 14:36	01/16/15 09:29	1
Gross Beta	15.0		1.07	1.84	10.0	0.333	pCi/Sample	01/15/15 14:38	01/16/15 09 29	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-2.77	W	17 1	17.1	20.0	14 9	pCi/Sample	01/15/15 14 46	01/16/15 12 50	1

HUE 25 Feb 15

TestAmerica St Louis

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Lab Sample ID: 160-10086-5

dample ib. 100-10000-5

Matrix: Filter

Client Sample ID: WAA-05-AF-PS-20150106

Date Collected: 01/06/15 15:00 Date Received: 01/12/15 15:15

			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(2\sigma+/-)	R	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None		4-				pCi/Sample	01/15/15 14:46	01/16/15 12 50	1
Radionuclide										

Client Sample ID: WAA-00-AF-FB-20150106

Date Collected: 01/06/15 00:00

Date Received: 01/12/15 15:15

Lab Sa	mple ID:	160-1	0086-6
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Matrix: Filter

Method: 9310 - Gro	ss Alpha / Be	ta (GFPC)	Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.274	W	0.213	0,215	(10.0)	0.281	pCi/Sample	01/15/15 14:36	01/16/15 09:29	1
Gross Beta	1.64	3	0.394	0.427	10.0	0.350	pCi/Sample	01/15/15 14:36	01/16/15 09:29	
Method; GA-01-R -	Cesium-137 8	& Other Gan	nma Emitters	s (GS)						
			Count	Total						
			Uncert.	UncerL						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RĹ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	2.58	W	6.30	6.30	20.0	11.1	pCi/Sample	01/15/15 14:46	01/18/15 21:30	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Resuit	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/15/15 14 46	01/18/15 21:30	1
Radionuclide										

HU6-25 Feb 15 Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-168591/1-A

Matrix: Filter

Analysis Batch: 168922

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 168591

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.4390		0.270	0.275	10.0	0.338	pCi/Sample	01/15/15 14:36	01/16/15 09:28	1
Gross Beta	0.2601	U	0.221	0.223	10.0	0.338	pCi/Sample	01/15/15 14:36	01/16/15 09:28	1

Lab Sample ID: LCS 160-168591/2-A

Matrix: Filter

Analysis Batch: 168922

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 168591

				iotai					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Gross Alpha	5.37	5.452		1.02	10.0	0.380	pCi/Samp	102	75 - 125

Lab Sample ID: LCSB 160-168591/3-A

Matrix: Filter

Analysis Batch: 168922

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 168591

-				Total					_	
	Spike	LCSB	LCSB	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Gross Beta	17.9	18.08		2.16	10.0	0.357	pCi/Samp	101	75 - 125	

Lab Sample ID: 160-10086-1 DU

Matrix: Filter

Analysis Batch: 168922

Client Sample ID: WAA-01-AF-PS-20150106

Prep Type: Total/NA

Prep Batch: 168591

Total Sample Sample DU DU Uncert. RER RL MDC Unit Limit Analyte Result Qual Result Qual $(2\sigma + / -)$ RER Gross Alpha 0.489 1.025 0.390 10.0 0.338 pCi/Samp 0.77 Gross Beta 12.3 11.01 1.45 10.0 0.338 pCi/Samp 0.42

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-168592/1-A Client Sample ID: Method Blank **Matrix: Filter**

Analysis Batch: 168955

Prep Type: Total/NA **Prep Batch: 168592**

			Count	i otai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.2938	U	5.22	5.22	20.0	9.65	pCi/Sample	01/15/15 14:46	01/16/15 12:48	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	01/15/15 14:46	01/16/15 12:48	1
Radionuclide										

TestAmerica St. Louis

QC Sample Results

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Client: Tetra Tech EM Inc.

Analysis Batch: 168956

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-168592/2-A

TestAmerica Job ID: 160-10086-2

Prep Type: Total/NA

Prep Batch: 168592

Client Sample ID: Lab Control Sample

				i otai						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Americium-241	32000	31300		3250		100	pCi/Samp	98	87 - 116	
Cesium-137	11100	11170		1170	20.0	54.5	pCi/Samp	101	87 - 120	
Cobalt-60	11800	11780		1190		40.8	pCi/Samr	100	87 - 115	

Lab Sample ID: 160-10086-1 DU Client Sample ID: WAA-01-AF-PS-20150106 **Matrix: Filter Prep Type: Total/NA**

Prep Batch: 168592

Analysis Batch	: 168955								Prep Batch: 1	68592
					Total					
	Sample	Sample	DU	DU	Uncert.					RER
Analyte	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Cesium-137	0.794	U —	-0.6050	U	5.08	20.0	9.34	pCi/Samp	0.13	1
					Total					
Other Detected	Sample	Sample	DU	DU	Uncert.					RER
Radionuclides	Result	Qual	Result	Qual	(2σ+/-)	RL	MDC	Unit	RER	Limit
Other Detected	None		None					pCi/Samr		
Radionuclide										

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10086-2

Rad

Prep Batch: 168591

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10086-1	WAA-01-AF-PS-20150106	Total/NA	Filter	None	
160-10086-1 DU	WAA-01-AF-PS-20150106	Total/NA	Filter	None	
160-10086-2	WAA-02-AF-PS-20150106	Total/NA	Filter	None	
160-10086-3	WAA-03-AF-PS-20150106	Total/NA	Filter	None	
160-10086-4	WAA-04-AF-PS-20150106	Total/NA	Filter	None	
160-10086-5	WAA-05-AF-PS-20150106	Total/NA	Filter	None	
160-10086-6	WAA-00-AF-FB-20150106	Total/NA	Filter	None	
LCS 160-168591/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-168591/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-168591/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 168592

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10086-1	WAA-01-AF-PS-20150106	Total/NA	Filter	None	
160-10086-1 DU	WAA-01-AF-PS-20150106	Total/NA	Filter	None	
160-10086-2	WAA-02-AF-PS-20150106	Total/NA	Filter	None	
160-10086-3	WAA-03-AF-PS-20150106	Total/NA	Filter	None	
160-10086-4	WAA-04-AF-PS-20150106	Total/NA	Filter	None	
160-10086-5	WAA-05-AF-PS-20150106	Total/NA	Filter	None	
160-10086-6	WAA-00-AF-FB-20150106	Total/NA	Filter	None	
LCS 160-168592/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-168592/1-A	Method Blank	Total/NA	Filter	None	

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TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J10181
Sample Numbers:	WAA-01-AF-PS-20150114, WAA-02-AF-PS-20150114, WAA-03-AF-PS-20150114, WAA-04-AF-PS-20150114, WAA-05-AF-PS-20150114, and WAA-00-AF-FB-20150114
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological in the applicable normal package and the available field and laboratory Ellis, certify that all data values.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10181 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and radium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank and field blank yielded low activities for one (of three) thorium isotopes and for none (of three) uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10181-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



Authorized for release by: 2/18/2015 2:44:59 PM

Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

.....LINKS

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Have a Question?



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10181-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Job ID: 160-10181-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10181-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 1/19/2015 11:00 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 20.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150114 (160-10181-1), WAA-02-AF-PS-20150114 (160-10181-2), WAA-03-AF-PS-20150114 (160-10181-3), WAA-04-AF-PS-20150114 (160-10181-4), WAA-05-AF-PS-20150114 (160-10181-5) and WAA-00-AF-FB-20150114 (160-10181-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 01/29/2015 and analyzed on 02/03/2015 and 02/04/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Job ID: 160-10181-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150114 (160-10181-1), WAA-02-AF-PS-20150114 (160-10181-2), WAA-03-AF-PS-20150114 (160-10181-3), WAA-04-AF-PS-20150114 (160-10181-4), WAA-05-AF-PS-20150114 (160-10181-5) and WAA-00-AF-FB-20150114 (160-10181-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/29/2015 and analyzed on 02/05/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150114 (160-10181-1), WAA-02-AF-PS-20150114 (160-10181-2), WAA-03-AF-PS-20150114 (160-10181-3), WAA-04-AF-PS-20150114 (160-10181-4), WAA-05-AF-PS-20150114 (160-10181-5) and WAA-00-AF-FB-20150114 (160-10181-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 01/29/2015 and analyzed on 02/05/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Relinquished by:

Relinquished by:

Chain of Custody Record

TestA	mei	rica

13715 Rider Trail North THE LEADER IN ENVIRONMENTAL TESTING Earth City, MO 63045 phone 314.298.8566 fax Regulatory Program: DW ☐ NPDES RCRA Other: TestAmerica Laboratories, Inc. **Client Contact** Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 1-19-15 COC No: Tetra Tech. Inc. Tel/Fax: 314-517-6798 Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: Kansas City, MO 64106 CALENDAR DAYS WORKING DAYS For Lab Use Only: (816) 412-1786 Phone TAT if different from Below Walk-in Client: (816) 816-410-1748 FAX 9315 Total Alpha Radium 2 weeks Lab Sampling: 9310 Gross Alpha/Beta Project Name: West Lake Landfill Site 1 week Site: Bridgeton, MO 2 days GA-01-R Gamm Job / SDG No .: PO# 1105610 1 day Туре Sample Sample #of (C=Comp, Sample Identification Date Time G=Grab) Matrix Cont Sample Specific Notes: WAA-01-AF-PS-20150114 1/14/15 11:25 Filter Air Х $\mathbf{x} \cdot \mathbf{x}$ Х 9315 Radium-226 (GFPC) WAA-02-AF-PS-20150114 1/14/15 contingent upon TAR results 10:15 Filter Air $X \mid X$ Х WAA-03-AF-PS-20150114 1/14/15 10:47 for all samples Filter Air Х $x \mid x \mid$ Х WAA-04-AF-PS-20150114 1/14/15 11:06 Filter Air 1 Х Х Χ WAA-05-AF-PS-20150114 1/14/15 10:30 Filter Air 1 Χ $X \mid X$ Х WAA-00-AF-FB-20150114 1/14/15 NA Х $x \mid x$ Filter Air Х Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: Sample Disposal (A fee may be assessed if samples are retained longer than 1 Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. Hammable Poison B Unknown Return to Client Disposal by Lab __Archive for_ Months Special Instructions/QC Requirements & Comments: Custody Seals Intact: Custody Seal No.: Cooler Temp. (°C): Obs'd: П № Corr'd: Therm ID No.:: Relinguished by Company: Date/Time: Company: 9 Received by Date/Time: Tetra Tech 1/19/15 1100

Date/Time:

Date/Time:

Received by:

Received in Laboratory by:

Company:

Company:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

1-19-15/1100

Date/Time

Date/Time:

Company:

Company:

Client: Tetra Tech EM Inc.

Job Number: 160-10181-1

Login Number: 10181 List Source: TestAmerica St. Louis

List Number: 1 Creator: Clarke, Jill C

Creator. Clarke, Jili C		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10181-1

Qualifiers

Rad

ND PQL

QC RER

RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

TestAmerica St. Louis

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10181-1	WAA-01-AF-PS-20150114	Filter	01/14/15 11:25	01/19/15 11:00
160-10181-2	WAA-02-AF-PS-20150114	Filter	01/14/15 10:15	01/19/15 11:00
160-10181-3	WAA-03-AF-PS-20150114	Filter	01/14/15 10:47	01/19/15 11:00
160-10181-4	WAA-04-AF-PS-20150114	Filter	01/14/15 11:06	01/19/15 11:00
160-10181-5	WAA-05-AF-PS-20150114	Filter	01/14/15 10:30	01/19/15 11:00
160-10181-6	WAA-00-AF-FB-20150114	Filter	01/14/15 00:00	01/19/15 11:00

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID 160-10181-1

Client Sample ID: WAA-01-AF-PS-20150114

Date Collected: 01/14/15 11:25 Date Received: 01/19/15 11:00 Lab Sample ID: 160-10181-1

Matrix: Filter

Analyte	Result	Qualifier	Gount Uncert. (20+/-)	Total Uncert (20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.131	U	0,231	0 231	1.00	0.400	pCi/Sample	01/29/15 12 44	02/03/15 19 17	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	105		40 - 110					01/29/15 12:44	02/03/15 19.17	1
Method: A-01-R - Iso			Count Uncert	Total Uncert.		neT.				
Analyte		Qualifier	(20+/-)	(20+1-)	RL	MDC		Prepared	Analyzed	Dil Fac
Thorium-228	0.0156	U _	0.129	0.129	1.00	0.267	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Thorium-230	0.297		0.164	0.166	1.00	0.137	pCi/Sample	01/29/15 13:14	02/05/15 13 55	1
Thorium-232	0.0791	U	0.0839	0.0841	1.00	0.0978	pCi/Sample	01/29/15 13.14	02/05/15 13:55	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	85.8		30 - 110					01/29/15 13 14	02/05/15 13 55	1
Method: A-01-R - Iso	otopic Uraniu	ım (Alpha S	pectrometry) Count Uncert	Total Uncert						
Aπalyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.144	7	0.108	0.109	1.00	0.105	pCi/Sample	01/29/15 13 14	02/05/15 13 49	1
	0.0236	and the second second	0.0471	0,0472	1.08	0,0707	pCi/Sample	01/29/15 13:14	02/05/15 13.49	1
Uranium-235/236		7	0.0926	0.0930	1.00	0.0567	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Uranium-235/236 Uranium-238	0.113	_								
		Qualifier	Limits					Prepared	Analyzed	Oil Fac

Client Sample ID: WAA-02-AF-PS-20150114

Date Collected: 01/14/15 10:15

Date Received: 01/19/15 11:00

Lab Sample ID: 160-10181-2

Matrix: Filter

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.119		0.249	0.250	1.00	0.437	pCi/Sample	01/29/15 12 44	02/03/15 19:18	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	105		40 - 110					01/29/15 12 44	02/03/15 19 18	1

		Count	Total						
		Uncert.	Uncert.						
Analyte	Result Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.186	0 162	0,163	100	0.232	pCi/Sample	01/29/15 13 14	02/05/15 13:55	1
Thorium-230	0.201	0 134	0 135	1.00	0 117	pCi/Sample	01/29/15 13 14	02/05/15 13 55	1
Thorium-232	0 0420	0 0594	0 0595	1.00	0 0630	pCi/Sample	01/29/15 13 14	02/05/15 13 55	1

HVE 25 Februs 2015

TestAmerica St. Louis

Client, Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Client Sample ID: WAA-02-AF-PS-20150114

Date Collected: 01/14/15 10:15 Date Received: 01/19/15 11:00 Lab Sample ID: 160-10181-2

Matrix: Filter

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dit Fac
Thorium-229	81 8		30 - 110					01/29/15 13:14	02/05/15 13 55	1
Method: A-01-R - Is	otopic Uraniu	ım (Alpha S	pectrometry	+						
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0621	U	0,0708	0.0710	1.00	0.0958	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Uranium-235/236	0.0431	U	0.0610	0 0611	1,00	0.0647	pCi/Sample	01/29/15 13 14	02/05/15 13:49	1
Uranium-238	0.0620	U	0.0707	0.0709	1.00	0.0956	pCi/Sample	01/29/15 13:14	02/05/15 13:49	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dii Fac
Uranium-232	95.2		30 - 110					01/29/15 13 14	02/05/15 13:49	1

Client Sample ID: WAA-03-AF-PS-20150114

Date Collected: 01/14/15 10:47

Lab Sample ID: 160-10181-3

Matrix: Filter

ate Received: 01/19/	15 11:00	a despress fragment			Agriculture restate a second					
Method: 9315 - Total	Apha Radiu	m (GFPC)								
		, ,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,192	6/	0.289	0.289	1.06	0.491	pCi/Sample	01/29/15 12:44	02/03/15 19:18	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	105		40 - 110					01/29/15 12:44	02/03/15 19:18	1
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(2\sigma+/-)	(2 0+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.276	ゴ	0.182	0,183	1.00	0.239	pCi/Sample	01/29/15 13:14	02/05/15 13 55	1
Thorium-230	0.395	3	0.177	0.180	1.00	0.123	pCi/Sample	01/29/15 13:14	02/05/15 13 55	1
Thorium-232	0.0622		0.0769	0,0771	1.00	0.115	pCi/Sample	01/29/15 13:14	02/05/15 13.55	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	907		30 - 110					01/29/15 13:14	02/05/15 13:55	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	ipectrometry Count Uncert.	Total Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0 0699	00	0.0797	0.0799	1.00	0.108	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Uranium-235/236	0 0243	W	0,0485	0.0486	1.00	0 0728	pCi/Sample	01/29/15 13 14	02/05/15 13:49	1
Uranium-238	0.G77B	7	0.0778	0,0781	1 00	0 0584	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	87 9	-	30 - 110					01/29/15 13.14	02/05/15 13 49	1

HVE 25 Fells

TestAmerica St. Louis

Client Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Client Sample ID: WAA-04-AF-PS-20150114

Date Collected: 01/14/15 11:06 Date Received: 01/19/15 11:00 Lab Sample ID: 160-10181-4

Matrix: Filter

Method: 9315 - Total			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.133	H	0.226	0.227	1.00	0.391	pCi/Sample	01/29/15 12:44	02/03/15 19 18	***
Carrier	%Yield	Quatttier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	108		40 - 110					01/29/15 12 44	02/03/15 19 18	
Method: A-01-R - Iso	topic Thoriu	m (Alpha S	pectrometry)							
			Count	Total						
			Uncert	Uncert.						
Analyte		Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
horium-228	0,220	ON _	0.178	0.179	(1.0)	0.253	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Thorium-230	0.393)	0.189	0.192	1.00	0.154	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
l'horium-232	0,0535	64	0,0738	0.0740	0.00	0,115	pCi/Sample	01/29/15 13:14	02/05/15 13 55	1
racer	%Yield	Qualifier	Limits					Prep⊋red	Analyzed	Dil Fa
Thorium-229	82.2		30 - 110					01/29/15 13 14	02/05/15 13:55	
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)							
	-	` '	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Jranium-233/234	0.159	3	0,120	0.120	1.00	0 116	pCi/Sample	01/29/15 13:14	02/05/15 13:49	
Uranium-235/236	-0.0108		0.0217	0,0217	1.00	0.144	pCi/Sample	01/29/15 13:14	02/05/15 13:49	
Uranium-238	0.0417	u	0.0590	0.0591	1.00	0.0626	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Uranium-232	82.3		30 - 110					01/29/15 13:14	02/05/15 13:49	
lient Sample ID:	WAA-05-A	F-PS-201	50114		AM			Lab Sam	ple ID: 160-1	0181-5
ate Collected: 01/14/										x: Filter
ate Received: 01/19/			- Salamati - Lacrico and and				- w // w/s		A4A	
Method: 9315 - Total	Apha Radiu	ım (GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(20+1-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dif Fac
Total Alpha Radium	0.0257	U	0.160	0.160	1,00	0,308	pCi/Sample	01/29/15 12:44	02/04/15 07 07	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	104		40.110					01/29/15 12 44	02/04/15 07 07	,
Method: A-01-R - Iso	topic Thoric	m (Alpha S	pectrometry)							
			Count	Total						
			UncerL	UncerL						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0,264	2	0.179	0.181	1.00	0.236	pCi/Sample	01/29/15 13:14	02/05/15 13 55	

TestAmerica St. Louis

Dil Fac

02/05/15 13:55

02/05/15 13:55

Analyzed

02/05/15 13 55

0 203

0.0966

1.00

1.00

HUG 25 Fel 15

0.0584 pCi/Sample

0 107 pCi/Sample

01/29/15 13 14

01/29/15 13 14

Prepared

01/29/15 13 14

0.198

0.0962

Limits

30 - 110

0.505

0,108

88.4

%Yield Qualifier

Thorium-230

Thorium-232

Thorium-229

Tracer

Chent: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Client Sample ID: WAA-05-AF-PS-20150114 Lab Sample ID: 160-10181-5

Date Collected: 01/14/15 10:30

Matrix: Filter

TestAmerica Job ID: 160-10181-1

Date Received: 01/19/15 11:00

			Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0300	Y	0.0864	0.0864	1.00	0.181	pCi/Sample	01/29/15 13.14	02/05/15 13:49	1
Uranium-235/236	0.0163	Y	0.0606	0.0606	1.00	0.155	pCi/Sample	01/29/15 13.14	02/05/15 13 49	1
Uranium-238	0.0804	W	0.0916	0.0919	1.00	0.124	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	78.3		30 - 110					01/29/15 13:14	02/05/15 13:49	1

Client Sample ID: WAA-00-AF-FB-20150114

Date Collected: 01/14/15 00:00 Date Received: 01/19/15 11:00 Lab Sample ID: 160-10181-6

Matrix: Filter

			Count Uncert,	Total Uncert,						
Analyte	Result	Qualifier	(2 0+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Aipha Radium	0.0302	W	0.197	0.197	1.00	0,371	pCi/Sample	01/29/15 12:44	02/04/15 07:07	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	105		40 - 110					01/29/15 12 44	02/04/15 07:07	1
Method: A-01-R - Iso	topic Th ori u	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+ <i>i</i> -)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0 199	W.	0.171	0.172	1.00	0 252	pCi/Sample	01/29/15 13 14	02/05/15 13:55	1
Thorium-230	0.315)	0.156	0,158	1.00	0.0578	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Thorium-232	0.000	01	0.0160	0.0160	(.00)	0.0575	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	90.3		30.110					01/29/15 13 14	02/05/15 13 55	1
Method: A-01-R - Iso	topic Uranii	ım (Alpha S	spectrometry)							
			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+1-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0227	6	0.0596	0.0596	1.00	0 128	pCi/Sample	01/29/15 13:14	02/05/15 13 49	1
Uranium-235/236	-0,0101	01	0,0202	0.0202	1.00	0.134	pCi/Sample	01/29/15 13:14	02/05/15 13.49	1
Uranium-238	0.0889	W	0.0883	0 0886	1.00	0_107	pCi/Sample	01/29/15 13:14	02/05/15 13.49	1
Tracer	% Yield	Quattfier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	905		30 - 110					01/29/15 13 14	02/05/15 13:49	1

HUG 25 Fol 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-171096/1-A

Matrix: Filter

Analysis Batch: 171817

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 171096

Analyzed

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	-0.1300	U	0.212	0.212	1.00	0.445	pCi/Sample	01/29/15 12:44	02/03/15 19:17	1

MB MB

Limits Carrier %Yield Qualifier 40 - 110 Ba Carrier 100

01/29/15 12:44 02/03/15 19:17

Prepared

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 171096**

Lab Sample ID: LCS 160-171096/2-A **Matrix: Filter**

Analysis Batch: 171589

				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Total Alpha	45.0	47.26		4.75	1.00	0.513	pCi/Samp	105	65 - 150

Radium

LCS LCS

Carrier %Yield Qualifier Ba Carrier 102 40 - 110

Lab Sample ID: LCSD 160-171096/3-A

Matrix: Filter

Analysis Batch: 171589

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 171096

				Total							
	Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Total Alpha	45.0	43.07		4.37	1.00	0.459	pCi/Samp	96	65 - 150	0.46	1

Radium

LCSD LCSD

Carrier %Yield Qualifier Limits Ba Carrier 99.7 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-171102/1-A

Matrix: Filter

Analysis Batch: 172656

Client	Sampl	a ID:	Mothod	Rlank

Prep Type: Total/NA

Prep Batch: 171102

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.07666	U	0.145	0.145	1.00	0.261	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Thorium-230	0.3524		0.176	0.178	1.00	0.134	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1
Thorium-232	-0.008481	U	0.0170	0.0170	1.00	0.113	pCi/Sample	01/29/15 13:14	02/05/15 13:55	1

мв мв

Tracer %Yield Qualifier Limits Prepared Analyzed Thorium-229 30 - 110 01/29/15 13:14 02/05/15 13:55 86.8

TestAmerica St. Louis

Dil Fac

TestAmerica Job ID: 160-10181-1

Prep Type: Total/NA

Prep Type: Total/NA

Client Sample ID: Method Blank

Analyzed

Prep Type: Total/NA

Client Sample ID: Lab Control Sample

Client Sample ID: Lab Control Sample Dup

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-171102/2-A **Matrix: Filter**

Analysis Batch: 172675

Prep Batch: 171102 Total LCS LCS %Rec. Spike Uncert. Added Result (2σ+/-) RL MDC Unit %Rec Limits Qual Thorium-230 1.00 16.1 17.09 1.85 0.110 pCi/Samp 106 81 - 118

LCS LCS Tracer %Yield Qualifier I imits Thorium-229 85.7 30 - 110

Lab Sample ID: LCSD 160-171102/3-A

Matrix: Filter

Analysis Batch: 172658

Prep Batch: 171102 Total LCSD LCSD Spike Uncert. %Rec. RER Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit 0.0607 pCi/Samp Thorium-230 16.1 17 92 1 93 1.00 112 81 - 118 0.22

LCSD LCSD Tracer %Yield Qualifier Limits 30 - 110 Thorium-229 84.8

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-171103/1-A

Matrix: Filter

Analysis Batch: 172646

Prep Batch: 171103 Count Total мв мв Uncert. Uncert. Dil Fac Analyte Result Qualifier RL MDC Unit $(2\sigma + / -)$ $(2\sigma + / -)$ Prepared Analyzed Uranium-233/234 0.06692 U 0.0881 0.0883 1.00 0.139 pCi/Sample 01/29/15 13:14 02/05/15 13:49 Uranium-235/236 0.04164 U 0.0775 0.0776 1.00 0.145 pCi/Sample 01/29/15 13:14 02/05/15 13:49 Uranium-238 0.01230 U 0.0457 0.0457 1.00 0.117 pCi/Sample 01/29/15 13:14 02/05/15 13:49

MR MR Qualifier Tracer %Yield Limits 30 - 110 Uranium-232 79 1

02/05/15 13:49 01/29/15 13:14

Lab Sample ID: LCS 160-171103/2-A

Matrix: Filter

Analysis Batch: 172647

Client Sample ID: Lab Control Sample Prep Type: Total/NA

Prepared

Prep Batch: 171103

Dil Fac

Total Spike LCS LCS Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits Uranium-233/23 25.5 25.28 2.56 1.00 0.150 pCi/Samp 99 84 - 120 Uranium-238 26.0 26.31 2.65 1.00 0.133 pCi/Samp 101 82 - 122

LCS LCS %Yield Qualifier Tracer Limits 30 - 110 Uranium-232 83.0

TestAmerica St. Louis

QC Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

30 - 110

Lab Sample ID: LCSD 160-171103/3-A

83.8

Matrix: Filter

Uranium-232

Analysis Batch: 172648

Client Sample ID: Lab	Cont	rol Sa	mple Dup
	Prep	Type:	Total/NA
	_	_	

Prep Batch: 171103

						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23			25.5	25.49		2.59	1.00	0.168	pCi/Samp	100	84 - 120	0.04	1
4													
Uranium-238			26.0	26.27		2.66	1.00	0.0625	pCi/Samp	101	82 - 122	0.01	1
	LCSD	LCSD											
Tracer	%Vield	Qualifier	l imits										

8

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QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Rad

Prep Batch: 171096

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10181-1	WAA-01-AF-PS-20150114	Total/NA	Filter	DPS-0	
160-10181-2	WAA-02-AF-PS-20150114	Total/NA	Filter	DPS-0	
160-10181-3	WAA-03-AF-PS-20150114	Total/NA	Filter	DPS-0	
160-10181-4	WAA-04-AF-PS-20150114	Total/NA	Filter	DPS-0	
160-10181-5	WAA-05-AF-PS-20150114	Total/NA	Filter	DPS-0	
160-10181-6	WAA-00-AF-FB-20150114	Total/NA	Filter	DPS-0	
LCS 160-171096/2-A	Lab Control Sample	Total/NA	Filter	DPS-0	
LCSD 160-171096/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0	
MB 160-171096/1-A	Method Blank	Total/NA	Filter	DPS-0	

Prep Batch: 171102

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10181-1	WAA-01-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-2	WAA-02-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-3	WAA-03-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-4	WAA-04-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-5	WAA-05-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-6	WAA-00-AF-FB-20150114	Total/NA	Filter	ExtChrom	
LCS 160-171102/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-171102/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-171102/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 171103

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batcl
160-10181-1	WAA-01-AF-PS-20150114	Total/NA	Filter	ExtChrom	-
160-10181-2	WAA-02-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-3	WAA-03-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-4	WAA-04-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-5	WAA-05-AF-PS-20150114	Total/NA	Filter	ExtChrom	
160-10181-6	WAA-00-AF-FB-20150114	Total/NA	Filter	ExtChrom	
LCS 160-171103/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-171103/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-171103/1-A	Method Blank	Total/NA	Filter	ExtChrom	

TestAmerica St. Louis

2

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10181-1

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10181-1	WAA-01-AF-PS-20150114	105	
160-10181-2	WAA-02-AF-PS-20150114	106	
160-10181-3	WAA-03-AF-PS-20150114	105	
160-10181-4	WAA-04-AF-PS-20150114	108	
160-10181-5	WAA-05-AF-PS-20150114	104	
160-10181-6	WAA-00-AF-FB-20150114	105	
LCS 160-171096/2-A	Lab Control Sample	102	
LCSD 160-171096/3-A	Lab Control Sample Dup	99.7	
MB 160-171096/1-A	Method Blank	100	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10181-1	WAA-01-AF-PS-20150114	85.8	
160-10181-2	WAA-02-AF-PS-20150114	81.8	
160-10181-3	WAA-03-AF-PS-20150114	90.7	
160-10181-4	WAA-04-AF-PS-20150114	82.2	
160-10181-5	WAA-05-AF-PS-20150114	88.4	
160-10181-6	WAA-00-AF-FB-20150114	90.3	
LCS 160-171102/2-A	Lab Control Sample	85.7	
LCSD 160-171102/3-A	Lab Control Sample Dup	84.8	
MB 160-171102/1-A	Method Blank	86.8	
Tracer/Carrier Legend			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10181-1	WAA-01-AF-PS-20150114	91.3	
160-10181-2	WAA-02-AF-PS-20150114	95.2	
160-10181-3	WAA-03-AF-PS-20150114	87.9	
160-10181-4	WAA-04-AF-PS-20150114	82.3	
160-10181-5	WAA-05-AF-PS-20150114	78.3	
160-10181-6	WAA-00-AF-FB-20150114	90.5	
LCS 160-171103/2-A	Lab Control Sample	83.0	
LCSD 160-171103/3-A	Lab Control Sample Dup	83.8	
MB 160-171103/1-A	Method Blank	79.1	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	J10273
Sample Numbers:	WAA-01-AF-PS-20150121, WAA-02-AF-PS-20150121, WAA-03-AF-PS-20150121, WAA-04-AF-PS-20150121, WAA-05-AF-PS-20150121, and WAA-00-AF-FB-20150121
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank
Packages from Subcontracted Laboratory Agency Radiological Laboratory A criteria specified in the applicable of the review was intended to identify apparent from the summary data path at were found, and data qualificationited to the available field and laborackage. Harry Ellis, certify that all data variables.	y problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Contified by House Ellio Chamist	Data
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10273 included five (5) environmental air (filter) samples and one (1) QC sample (a field blank). Samples were analyzed for total alpha-emitting radium by EPA SW-846 Method 9315 and for isotopic (alpha-emitting) thorium and radium by Department of Energy (DOE) Method A-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Insufficient sample was available for MS/MSD analyses. Duplicate LCS analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank and field blank yielded low activities for two (of three) thorium isotopes and for none (of three) uranium isotopes. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries and relative percent differences from the duplicate LCS analyses were within established control limits.

V. Surrogates

These radioanalytical methods use a "carrier" or "tracer", whose recovery serves the same functions as surrogate recoveries. All carrier and tracer recoveries were within the laboratory's QC limits. No qualifications were applied.

VI. Comments

All detected results were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10273-1

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Authorized for release by: 2/24/2015 10:35:35 AM

Erika Gish, Project Manager II (314)298-8566 erika.gish@testamericainc.com

.....LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10273-1

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Job ID: 160-10273-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10273-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 1/26/2015 11:30 AM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 18.0° C.

TOTAL ALPHA RADIUM (GFPC)

Samples WAA-01-AF-PS-20150121 (160-10273-1), WAA-02-AF-PS-20150121 (160-10273-2), WAA-03-AF-PS-20150121 (160-10273-3), WAA-04-AF-PS-20150121 (160-10273-4), WAA-05-AF-PS-20150121 (160-10273-5) and WAA-00-AF-FB-20150121 (160-10273-6) were analyzed for Total Alpha Radium (GFPC) in accordance with SW- 846 Method 9315. The samples were prepared on 02/02/2015 and analyzed on 02/10/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page. **ISOTOPIC THORIUM (ALPHA SPECTROMETRY)**

TestAmerica St. Louis 2/24/2015

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Job ID: 160-10273-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Samples WAA-01-AF-PS-20150121 (160-10273-1), WAA-02-AF-PS-20150121 (160-10273-2), WAA-03-AF-PS-20150121 (160-10273-3), WAA-04-AF-PS-20150121 (160-10273-4), WAA-05-AF-PS-20150121 (160-10273-5) and WAA-00-AF-FB-20150121 (160-10273-6) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 02/02/2015 and analyzed on 02/12/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples WAA-01-AF-PS-20150121 (160-10273-1), WAA-02-AF-PS-20150121 (160-10273-2), WAA-03-AF-PS-20150121 (160-10273-3), WAA-04-AF-PS-20150121 (160-10273-4), WAA-05-AF-PS-20150121 (160-10273-5) and WAA-00-AF-B-20150121 (160-10273-6) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with A-01-R. The samples were prepared on 02/02/2015 and analyzed on 02/11/2015.

Insufficient sample volume was available to perform a sample duplicate (DUP). The samples are filters that must be split between multiple analysis. A LCS/LCSD was used instead of a sample duplicate.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

13715 Rider Trail North

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Earth City, MO 63045 phone 314.298.8566 fax Regulatory Program: Dw NPDES RCRA Other: TestAmerica Laboratories, Inc. **Client Contact** Project Manager: Dave Kinroth Site Contact: Dave Kinroth Date: 1-26-15 COC No: Tetra Tech, Inc. Tel/Fax: 314-517-6798 Lab Contact: Mike Franks Carrier: NA COCs 415 Oak Street **Analysis Turnaround Time** Sampler: Kansas City, MO 64106 CALENDAR DAYS **✓** WORKING DAYS For Lab Use Only: (816) 412-1786 Phone TAT if different from Below Walk-in Client: (816) 816-410-1748 FAX 9315 Total Alpha Radium 2 weeks A-01-R Isotopic Uranium Lab Sampling: GA-01-R Gamm Spec Project Name: West Lake Landfill Site 1 week Site: Bridgeton, MO 2 davs Job / SDG No.: PO# 1105610 1 day Type Sample Sample #of (C=Comp, Sample Identification Date Time Cont. G=Grab) Matrix Sample Specific Notes: WAA-01-AF-PS-20150121 1/21/15 11:22 Х Filter Air Х 9315 Radium-226 (GFPC) WAA-02-AF-PS-20150121 1/21/15 10:15 Filter Air Χ Χ Х contingent upon TAR results WAA-03-AF-PS-20150121 1/21/15 10:53 Filter Х XX Х for all samples Air WAA-04-AF-PS-20150121 1/21/15 11:08 Filter Air Χ $X \mid X$ Х WAA-05-AF-PS-20150121 1/21/15 10:31 Filter Air Х X X Х WAA-00-AF-FB-20150121 1/21/15 NA Χ Х Filter Air $X \mid X$ Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other Possible Hazard Identification: Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample. ✓Non-Hazard Hammable Skin Irritant Poison B Unknown Return to Client Disposal by Lab Archive for Months Special Instructions/QC Requirements & Comments: Custody Seals Intact: Custody Seal No.: Cooler Temp. (°C): Obs'd: Corr'd: Therm ID No.: Relinquished by Company: Date/Time: Received by: Daţe/Time: Company: Tech -26-19511:3 14 Tetra Ilu 1130 Relinquished by: Company: Date/Time: Received by: Company: Dáte/Tíme: Relinguished by: Date/Time: Company: Received in Laboratory by: Company: Date/Time:

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc. Job Number: 160-10273-1

Login Number: 10273 List Source: TestAmerica St. Louis

List Number: 1

Creator: Daniels, Brian J

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Job ID: 160-10273-1

Qualifiers

Rad

ND PQL

QC RER

RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Method	Method Description	Protocol	Laboratory
9315	Total Apha Radium (GFPC)	SW846	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10273-1	WAA-01-AF-PS-20150121	Filter	01/21/15 11:22	01/26/15 11:30
160-10273-2	WAA-02-AF-PS-20150121	Filter	01/21/15 10:15	01/26/15 11:30
160-10273-3	WAA-03-AF-PS-20150121	Filter	01/21/15 10:53	01/26/15 11:30
160-10273-4	WAA-04-AF-PS-20150121	Filter	01/21/15 11:08	01/26/15 11:30
160-10273-5	WAA-05-AF-PS-20150121	Filter	01/21/15 10:31	01/26/15 11:30
160-10273-6	WAA-00-AF-FB-20150121	Filter	01/21/15 00:00	01/26/15 11:30

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Client Sample ID: WAA-01-AF-PS-20150121

Date Collected: 01/21/15 11:22 Date Received: 01/26/15 11:30 Lab Sample ID: 160-10273-1

Matrix: Filter

10-41- 4- 0045 T-4-1	Auto Dedica	(OFDA)								
Method: 9315 - Total	Арпа кашип	n (GFPC)								
			Count	Total						
			Uncert	Uncert.						
Analyte	Result (Qualifier	(2 0+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.0168	N.	0.227	0.227	1,00	0 419	pCi/Sample	02/02/15 13:30	02/10/15 12 11	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					02/02/15 13:30	02/10/15 12 11	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert (20+/-)	Total Uncert (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.213	W	0.204	0.205	1.00	0.315	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Thorlum-230	0.506	7	0.217	0.222	1.00	0 151	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Thorium-232	0,108	W	0.128	0.128	(.00)	0.202	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	77.3		30 - 110					02/02/15 10:42	02/12/15 18:31	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

			Uncert	Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Oil Fac
Uranium-233/234	0,160	U	0.135	0.136	1,00	0.188	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-235/236	0.0134	W	0.0499	0.0499	1.00	0.127	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-238	0,0585	ig	0,0770	0.0772	1,00	0.121	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Total

30 - 110

Client Sample ID: WAA-02-AF-PS-20150121

92.0

Date Collected: 01/21/15 10:15 Date Received: 01/26/15 11:30

Uranium-232

Lab Sample ID: 160-10273-2

02/02/15 10:42 02/11/15 13:45

Matrix: Filter

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0 227	W	0.226	0.227	1.00	0.363	pCi/Sample	02/02/15 13:30	02/10/15 17 54	1
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	106		40-110					02/02/15 13:30	02/10/15 17:54	1

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.314	7	0.193	0.195	1,00	0.249	pCi/Sample	02/02/15 10.42	02/12/15 18 31	1
Thorium-230	0.451	T	0.187	0.191	1.00	0.122	pCi/Sample	02/02/15 10:42	02/12/15 18 31	1
Thorium-232	0,0139	41	0.0587	0.0587	1,00	0.136	pCi/Sample	02/02/15 10:42	02/12/15 18 31	1

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TestAmerica St. Louis

Client: Tetra Tech EM Inc.

Project/Site. West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Client Sample ID: WAA-02-AF-PS-20150121

Date Collected: 01/21/15 10:15

Lab Sample ID: 160-10273-2

Matrix: Filter

Date Received: 01/26/15 11:30

Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	92.7		30 - 110					02/02/15 10 42	02/12/15 18:31	1
Method: A-01-R - Iso	topic Uraniu	ım (Alpha S	pectrometry)						
			Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(2\sigma+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.153	7	0.122	0.123	1.00	0,146	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-235/236	0.0144	U	0.0533	0.0533	1.00	0.136	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-238	-0.0411	W	0.0368	0.0369	1.00	0,171	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	85.0		30 - 110					02/02/15 10:42	02/11/15 13:45	1

Client Sample ID: WAA-03-AF-PS-20150121

Date Collected: 01/21/15 10:53

Ba Carrier

Date Received: 01/26/15 11:30

Lab	Sample	ID:	160-10273-3
			Matrix: Filter

02/10/15 17 54

02/02/15 13:30

Method: 9315 - Total Apha Radium (GFPC) Total Count Uncert Uncert. RL Result Qualifier MDC Unit Analyte $(2\sigma + l -)$ $(2\sigma + l -)$ Prepared Analyzed Dil Fac 4 Total Alpha Radium 0.198 0.218 0.219 1.00 0.355 pCi/Sample 02/02/15 13:30 02/10/15 17:54 Carrier % Yield Qualifier Limits Prepared Analyzod Dit Fac

40 - 110

Count

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

104

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.368	L	0.188	0.190	1.00	0.178	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Thorium-230	0.527	7	0,218	0.222	1,00	0.166	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Thorium-232	0.0717	4	0.0828	0.0830	1.00	0.113	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	83 4		30 - 110					02/02/15 10 42	02/12/15 18 31	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDÇ	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0316	W	0,0677	0.0678	1.00	0.133	pCi/Sample	02/02/15 10:42	02/11/15 13 45	1
Uranium-235/236	0.0131	51 -	0.0486	0.0487	1.00	0,124	pCi/Sample	02/02/15 10 42	02/11/15 13:45	1
Uranium-238	0.191	7	0 120	0.121	1.00	0.0995	pCi/Sample	02/02/15 10 42	02/11/15 13.45	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	96.7		30 - 110					02/02/15 10 42	02/11/15 13 45	1

Total

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Client: Tetra Tech EM Inc.

Project/Site. West Lake Landfill - Filters

Lab Sample ID: 160-10273-4

TestAmerica Job ID. 160-10273-1

Matrix: Filter

Client Sample ID: WAA-04-AF-PS-20150121

Date Collected: 01/21/15 11:08 Date Received: 01/26/15 11:30

			Count Uncert	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.0806	M	0.144	0.144	1.00	0.253	pCi/Sample	02/02/15 13:30	02/10/15 17:54	
Carrier	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	107	-	40 - 110					02/02/15 13 30	02/10/15 17:54	1
Method: A-01-R - Iso	topic Thoriu	ım (Alpha S								
			Count Uncert	Total Uncert	RL	MDC	Unit	Prepared	Analyzed	Dîl Fac
Analyte		Qualifier	Count	Total	RL 1.00	MDC 0,212		Prepared 02/02/15 10:42	Analyzed 02/12/15 18:31	Dil Fac
Analyte Thorium-228	Result	Qualifier	Count Uncert (20+/-)	Total Uncert. (20+/-)					- Annie	Dil Fac
Analyte	Result 0.412	Qualifier	Count Uncert (20+/-) 0.207	Total Uncert (20+/-) 0.210	1.00	0.212	pCi/Sample pCi/Sample	02/02/15 10:42	02/12/15 18:31	Dil Fac
	Result 0.412 0.249 0.0834	Qualifier	Count Uncert (20+/-) 0.207 0.161	Total Uncert. (20+/-) 0.210 0.163	1.00	0,212 0,181	pCi/Sample pCi/Sample	02/02/15 10 42 02/02/15 10 42	02/12/15 18:31 02/12/15 18:31	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

89.5

0.452

			Uncert.	Uncert.						
Analyte	Result	Qualifler	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.116	7	0.0943	0.0948	1.00	0.0578	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-235/236	0.0479	W	0.0678	0.0679	1.00	0.0719	pCi/Sample	02/02/15 10 42	02/11/15 13:45	1
Uranium-238	0.0881	القا	0.0874	0.0877	1.00	0.106	pCi/Sample	02/02/15 10.42	02/11/15 13 45	1
Tracer	% Vield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Total

30 - 110

0,196

Client Sample ID: WAA-05-AF-PS-20150121

Date Collected: 01/21/15 10:31 Date Received: 01/26/15 11:30

Uranium-232

Thorium-230

Lab Sample ID: 160-10273-5

02/11/15 13:45

02/02/15 10:42

02/02/15 10:42

Matrix: Filter

Pate Neceived. 01/20/	10 11.00		W 100 21 BM1 17							
Method: 9315 - Total	Apha Radiu	ım (GFPC)								
	•		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0,366	del .	0 250	0.253	1.00	0.372	pCi/Sample	02/02/15 13:30	02/10/15 17 54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carner	105		40 - 110					02/02/15 13 30	02/10/15 17 54	1
Method: A-01-R - Iso	topic Thoric	ım (Alpha S	pectrometry)							
			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dit Fac
Thorium-228	0,246	7	0.152	0.153	1 00	0.170	pCi/Sample	02/02/15 10:42	02/12/15 18:31	1

Thorium-232 0.0321 4 0.0689 0.0690 0.136 pCi/Sample 02/02/15 10 42 02/12/15 18 31 %Yield Qualifier Limits Tracer Prepared Analyzed 30 - 110 02/02/15 10 42 02/12/15 18 31 922 Thorium-229

1.00

0,199

TestAmerica St. Louis

02/12/15 18.31

0 170 pCi/Sample

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID 160-10273-1

Client Sample ID: WAA-05-AF-PS-20150121

Date Collected: 01/21/15 10:31 Date Received: 01/26/15 11:30 Lab Sample ID: 160-10273-5

Matrix: Filter

Method:	A-01-R -	Isotopic L	Iranium I	Aloha	Spectrom	etry)

			Count	Total
			Uncert.	Uncert,
Analyte	Result	Qualifier	(20+/-)	(20+/-)
Uranium-233/234	0.104	7	0.0926	0.0930
Uranium-235/236	0,0232	W	0.0464	0.0464
Uranium-238	0.0589	U	0.0775	0.0777
Tracer	%Yield	Qualifier	Limits	

30 - 110

Di) Fac	Analyzed	Prepared	Unit	MDC	RL
1	02/11/15 13:45	02/02/15 10:42	pCi/Sample	0.103	1.00
1	02/11/15 13:45	02/02/15 10.42	pCi/Sample	0.0696	1.00
1	02/11/15 13 45	02/02/15 10 42	pCi/Sample	0.122	1.00
Dil Fac	Analyzed	Prepared			
1	02/11/15 13:45	02/02/15 10 42			

Client Sample ID: WAA-00-AF-FB-20150121

Date Collected: 01/21/15 00:00 Date Received: 01/26/15 11:30

Uranium-232

Lab Sample ID: 160-10273-6

Matrix: Filter

Method: 9315 - Total Apha Radium (GFPC)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.0332	u	0.226	0.226	1.00	0,414	pCi/Sample	02/02/15 13:30	02/10/15 17:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					02/02/15 13 30	02/10/15 17.54	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

			Count	Total						
			Uncert.	Uncert,						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorlum-228	0.327	7	0.197	0.199	1.00	0.249	pCi/Sample	02/02/15 10:42	02/12/15 18 31	1
Thorium-230	0.227	7	0,143	0.144	1.00	0.144	pCi/Sample	02/02/15 10 42	02/12/15 18:31	1
Thorium-232	0.0374	u	0.0720	0.0721	1.00	0,137	pCi/Sample	02/02/15 10 42	02/12/15 18 31	1
Tracer	% Yield	Qualifier	Limits					Prepared	Analyzed	Dil Faç
Thorium-229	88.1		30 - 110					02/02/15 10 42	02/12/15 18 31	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+ <i>i</i> -)	(2\sigma+l-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.0913	uly	0.0890	0.0894	1.00	0,116	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-235/236	0 0348	U4	0,0648	0.0649	1.00	0.122	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-238	0.0558	ug	0 0735	0.0737	1,00	0.116	pCi/Sample	02/02/15 10 42	02/11/15 13:45	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	95 2		30 - 110					02/02/15 10 42	02/11/15 13 45	1

Total

Count

HUE 25 Fel 15

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Method: 9315 - Total Apha Radium (GFPC)

Lab Sample ID: MB 160-171582/1-A

Matrix: Filter

Analysis Batch: 173100

Client Sample ID: Method Blank

Prep Type: Total/NA **Prep Batch: 171582**

	МВ	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Alpha Radium	0.03252	U	0.205	0.205	1.00	0.381	pCi/Sample	02/02/15 13:30	02/10/15 12:10	1

Total

Count

MB MB

Carrier **%Yield Qualifier** Limits Ba Carrier 95.3 40 - 110

Prepared

02/02/15 13:30

Client Sample ID: Lab Control Sample

Analyzed

02/10/15 12:10

Prep Type: Total/NA **Prep Batch: 171582**

Lab Sample ID: LCS 160-171582/2-A **Matrix: Filter**

Analysis Batch: 173651

				Total					
	Spike	LCS	LCS	Uncert.					%Rec.
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits
Total Alpha	45.0	42.27		4.17	1.00	0.333	pCi/Samp	94	65 - 150

Radium

LCS LCS Carrier %Yield Qualifier Ba Carrier 96.8

40 - 110

Lab Sample ID: LCSD 160-171582/3-A

Matrix: Filter

Analysis Batch: 173651

Client Sample ID: Lab	Control	Sample Dup

Prep Type: Total/NA **Prep Batch: 171582**

				Total						
	Spike	LCSD	LCSD	Uncert.				%Rec.		RER
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	RER	Limit
Total Alpha	45.0	38.69		3.85	1.00	0.360 pCi/Samp	86	65 - 150	0.45	1

Radium

LCSD LCSD Carrier %Yield Qualifier Limits Ba Carrier 97.1 40 - 110

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-171556/1-A

Matrix: Filter

Analysis Batch: 174062

Client Sample ID: Method Bla	ınk
Prep Type: Total/	NA

Prep Batch: 171556

Analysis Batch: 1	74062								Prep Batch:	1/1556
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.3207		0.165	0.167	1.00	0.130	pCi/Sample	02/02/15 10:42	02/12/15 18:32	1
Thorium-230	0.3532		0.176	0.178	1.00	0.146	pCi/Sample	02/02/15 10:42	02/12/15 18:32	1
Thorium-232	-0.01646	U	0.0233	0.0233	1.00	0.130	pCi/Sample	02/02/15 10:42	02/12/15 18:32	1
	МВ	МВ								
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Thorium-229	84.8		30 - 110					02/02/15 10:42	02/12/15 18:32	1

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Dil Fac

TestAmerica Job ID: 160-10273-1

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-171556/2-A

Matrix: Filter

Analysis Batch: 174063

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 171556

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result (2σ+/-) RL MDC Unit %Rec Limits Thorium-230 1.00 0.0574 pCi/Samp 16.1 18.01 1.91 112 81 - 118

LCS LCS

Qualifier Tracer %Yield I imits Thorium-229 88.7 30 - 110

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 171556

Lab Sample ID: LCSD 160-171556/3-A

Matrix: Filter

Analysis Batch: 174065

Total LCSD LCSD Spike

RER Uncert. %Rec. Analyte Added Result Qual $(2\sigma + / -)$ RL MDC Unit %Rec Limits RER Limit Thorium-230 16.1 2.01 1.00 0.0632 pCi/Samp 117 18 73 81 - 118 0.18

LCSD LCSD

Tracer %Yield Qualifier Limits Thorium-229 82.3 30 - 110

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-171559/1-A

Matrix: Filter

Analysis Batch: 173515

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 171559

Prepared

			Count	iotai						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.06663	U	0.0835	0.0837	1.00	0.131	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-235/236	-0.01843	U	0.0261	0.0261	1.00	0.145	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1
Uranium-238	0.0000	U	0.0148	0.0148	1.00	0.0532	pCi/Sample	02/02/15 10:42	02/11/15 13:45	1

Total

Count

MB MR Qualifier Tracer %Yield

Limits 30 - 110 Uranium-232 99.3

02/11/15 13:45 02/02/15 10:42

Analyzed

Lab Sample ID: LCS 160-171559/2-A

Matrix: Filter

Analysis Batch: 173517

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 171559**

Dil Fac

				iotai						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Uranium-233/23	25.5	24.82		2.51	1.00	0.182	pCi/Samp	97	84 - 120	
4										
Uranium-238	26.0	26.31		2.64	1.00	0.192	pCi/Samp	101	82 - 122	

LCS LCS

%Yield Qualifier Tracer Limits 89.3 30 - 110 Uranium-232

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QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCSD 160-171559/3-A

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

TestAmerica Job ID: 160-10273-1

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 171559

Analysis Batch: 1/35	18									Prep B	atcn: 1	/1559
					Total							
		Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Uranium-233/23		25.5	25.29		2.56	1.00	0.132	pCi/Samp	99	84 - 120	0.09	1
4												
Uranium-238		26.0	26.20		2.63	1.00	0.0601	pCi/Samp	101	82 - 122	0.02	1
LC	SD LCSD											
Tracer %Yie	eld Qualifier	Limits										
Uranium-232 83	7.7	30 - 110										

QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10273-1

Rad

Prep Batch: 171556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10273-1	WAA-01-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-2	WAA-02-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-3	WAA-03-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-4	WAA-04-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-5	WAA-05-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-6	WAA-00-AF-FB-20150121	Total/NA	Filter	ExtChrom	
LCS 160-171556/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-171556/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-171556/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 171559

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10273-1	WAA-01-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-2	WAA-02-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-3	WAA-03-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-4	WAA-04-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-5	WAA-05-AF-PS-20150121	Total/NA	Filter	ExtChrom	
160-10273-6	WAA-00-AF-FB-20150121	Total/NA	Filter	ExtChrom	
LCS 160-171559/2-A	Lab Control Sample	Total/NA	Filter	ExtChrom	
LCSD 160-171559/3-A	Lab Control Sample Dup	Total/NA	Filter	ExtChrom	
MB 160-171559/1-A	Method Blank	Total/NA	Filter	ExtChrom	

Prep Batch: 171582

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch	
160-10273-1	WAA-01-AF-PS-20150121	Total/NA	Filter	DPS-0	_	
160-10273-2	WAA-02-AF-PS-20150121	Total/NA	Filter	DPS-0		
160-10273-3	WAA-03-AF-PS-20150121	Total/NA	Filter	DPS-0		
160-10273-4	WAA-04-AF-PS-20150121	Total/NA	Filter	DPS-0		
160-10273-5	WAA-05-AF-PS-20150121	Total/NA	Filter	DPS-0		
160-10273-6	WAA-00-AF-FB-20150121	Total/NA	Filter	DPS-0		
LCS 160-171582/2-A	Lab Control Sample	Total/NA	Filter	DPS-0		
LCSD 160-171582/3-A	Lab Control Sample Dup	Total/NA	Filter	DPS-0		
MB 160-171582/1-A	Method Blank	Total/NA	Filter	DPS-0		

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Method: 9315 - Total Apha Radium (GFPC)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-10273-1	WAA-01-AF-PS-20150121	103	
160-10273-2	WAA-02-AF-PS-20150121	106	
160-10273-3	WAA-03-AF-PS-20150121	104	
160-10273-4	WAA-04-AF-PS-20150121	107	
160-10273-5	WAA-05-AF-PS-20150121	105	
160-10273-6	WAA-00-AF-FB-20150121	103	
LCS 160-171582/2-A	Lab Control Sample	96.8	
LCSD 160-171582/3-A	Lab Control Sample Dup	97.1	
MB 160-171582/1-A	Method Blank	95.3	
Tracer/Carrier Legend			
Ba = Ba Carrier			

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

			Percent Yield (Acceptance Limits)
		Th-229	
Lab Sample ID	Client Sample ID	(30-110)	
160-10273-1	WAA-01-AF-PS-20150121	77.3	
160-10273-2	WAA-02-AF-PS-20150121	92.7	
160-10273-3	WAA-03-AF-PS-20150121	83.4	
160-10273-4	WAA-04-AF-PS-20150121	82.7	
160-10273-5	WAA-05-AF-PS-20150121	92.2	
160-10273-6	WAA-00-AF-FB-20150121	88.1	
_CS 160-171556/2-A	Lab Control Sample	88.7	
LCSD 160-171556/3-A	Lab Control Sample Dup	82.3	
MB 160-171556/1-A	Method Blank	84.8	

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Filter Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
		U-232	
Lab Sample ID	Client Sample ID	(30-110)	
160-10273-1	WAA-01-AF-PS-20150121	92.0	
160-10273-2	WAA-02-AF-PS-20150121	85.0	
160-10273-3	WAA-03-AF-PS-20150121	96.7	
160-10273-4	WAA-04-AF-PS-20150121	89.5	
160-10273-5	WAA-05-AF-PS-20150121	92.1	
160-10273-6	WAA-00-AF-FB-20150121	95.2	
_CS 160-171559/2-A	Lab Control Sample	89.3	
_CSD 160-171559/3-A	Lab Control Sample Dup	87.7	
MB 160-171559/1-A	Method Blank	99.3	

U-232 = Uranium-232

TestAmerica St. Louis

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri						
Laboratory:	TestAmerica Laboratories, Inc. (Earth City, Missouri)						
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)						
Review Date February 25, 2015							
Sample Delivery Group (SDG): J10333							
Sample Numbers: WAA-01-AF-PS-20150128, WAA-02-AF-PS-20150128, WAA-05-AF-20150128, WAA-04-AF-PS-20150128, WAA-05-AF-20150128, and WAA-00-AF-FB-20150128							
Matrix / Number of Samples:	5 Air Samples and 1 Field Blank						
Packages from Subcontracted Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological Laboratory Agency Radiological in the applicable normal package and the available field and laboratory Ellis, certify that all data values.	problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data adidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.						
	25 February 2015						
Certified by Harry Ellis, Chemist	Date						

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) J10333 included five (5) environmental air (filter) samples and one (1) QC samples (a field blank). Samples were analyzed for gross alpha and beta radiation by EPA SW-846 Method 9310 and for cesium-137 and other gamma-emitters by Department of Energy (DOE) Method Ga-01-R. The following summarizes the data validation that was performed.

RADIOANALYTICAL ANALYSES

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. LCS and duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

The laboratory (method) blank yielded no detectable activities and the field blank a low beta activity. The other field samples yielded more than 5 times the field blank beta activity, so no further qualifications were applied.

IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

V. Surrogates

Surrogates are not used in these radioanalytical methods.

VI. Comments

Some detected activities were less than their reporting limits ("RL"). These extrapolations should be qualified as estimated (flagged "J").

VII. Overall Assessment of Data

Overall data quality is acceptable, with no significant qualifications applied. All data are usable as qualified for their intended purposes.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

TestAmerica Job ID: 160-10333-2

Client Project/Site: West Lake Landfill - Filters

For:

Tetra Tech EM Inc. 415 Oak Street Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Authorized for release by: 2/10/2015 3:32:55 PM
Elizabeth Hoerchler, Project Mgmt. Assistant elizabeth.hoerchler@testamericainc.com

Designee for Erika Gish, Project Manager II (314)298-8566

erika.gish@testamericainc.com

Elizabeth M. Aburcheur

Review your project results through
Total Access



Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Tetra Tech EM Inc. Project/Site: West Lake Landfill - Filters TestAmerica Job ID: 160-10333-2

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Job ID: 160-10333-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: West Lake Landfill - Filters

Report Number: 160-10333-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 02/02/2015; the samples arrived in good condition and properly preserved. The temperature of the coolers at receipt was 19.0° C.

GROSS ALPHA AND GROSS BETA RADIOACTIVITY

Samples WAA-01-AF-PS-20150128 (160-10333-1), WAA-02-AF-PS-20150128 (160-10333-2), WAA-03-AF-PS-20150128 (160-10333-3), WAA-04-AF-PS-20150128 (160-10333-4), WAA-05-AF-PS-20150128 (160-10333-5) and WAA-00-AF-FB-20150128 (160-10333-6) were analyzed for Gross Alpha and Gross Beta Radioactivity in accordance with SW846 9310. The samples were prepared and analyzed on 02/03/2015.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 & OTHER GAMMA EMITTERS (GS)

Samples WAA-01-AF-PS-20150128 (160-10333-1), WAA-02-AF-PS-20150128 (160-10333-2), WAA-03-AF-PS-20150128 (160-10333-3), WAA-04-AF-PS-20150128 (160-10333-4), WAA-05-AF-PS-20150128 (160-10333-5) and WAA-00-AF-FB-20150128 (160-10333-6) were

TestAmerica St. Louis 2/10/2015

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Case Narrative

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Job ID: 160-10333-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with GA-01-R. The samples were prepared and analyzed on 02/03/2015.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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TestAmerica St. Louis

Chain of Custody Record

13715 Rider Trail North

Earth City, MO 63045 phone 314.298.8566 fax	Boan	l-fam. De.	F	_ ,					_												THE LEADER IN ENVIRONMENTAL TESTING		
•		latory Pro			NPDES		□RCR/	·		Other:			· ·								TestAmerica Laboratories, Inc.		
Client Contact Tetra Tech, Inc.			Dave Kinrot	<u>th</u>		Site Contact: Dave Kinroth									2-2-						COC No:		
415 Oak Street		314-517-67	200 Contacti Mine Franco						C	arrie	er: N	A					1 of1 COCs						
Kansas City, MO 64106			urnaround			41		.	['			1 1	, .				,				Sampler:		
(816) 412-1786 Phone	CALEND			KING DAYS		- 1	_	1	'				<i>i</i>			1 1	1				For Lab Use Only:		
(816) 816-410-1748 FAX	-¶	Tif different from		20	-	_ -	<i>[</i>]		ε '	_	- D	. 1	,				. [Walk-in Client:		
Project Name: West Lake Landfill Site	1 🗒		weeks				Seta	8	릁 '	ını.	들을		.				.				Lab Sampling:		
Site: Bridgeton, MO	1		week	-			SD 1a/B	Spec	1 2 E	[월]	728 Ura	.	<i>i</i>		ŀ								
P O # 1105610			2 days L day			Sample MS / MS	MS / MS ss Alpha	Gamm	å,	용.	ed E		, [.	-1			Job / SDG No.:		
		r 	, cay Sample			101	SS.	8	la A	of S	ag g	. 1	,]	- [
Sample Identification	Sample Date	Sample Time	Type (C≡Comp,	Matrix	# of Cont.	Filtered	Perform MS / MSD (Y 9310 Gross Alpha/Beta	GA-01-R	9315 Total Alpha Radium	A-01-R Isotopic Thorium	A-01-R Isotopic Uranium * 9315 Radium-226 (GFPC)										Sample Specific Notes:		
WAA-01-AF-PS-20150128	1/28/15	11:12	Filter	Air	1	Ħ	X		1		X X	怈	十	\dagger	\dagger	\forall	\forall	au	十	+			
WAA-02-AF-PS-20150128	1/28/15	10:12	Filter	Air	1	H	X			TT	$\frac{^{1}}{x}$	11	十	+	+	H	\dashv	+	+	++	* 9315 Radium-226 (GFPC)		
WAA-03-AF-PS-20150128	1/28/15	10:40	Filter	Air		H	X	1			$\frac{^{1}}{x}$	\top	十	+	+		\dashv	+	+	+-	for all samples		
WAA-04-AF-PS-20150128	1/28/15	10:58	Filter	Air	1	H	X	1	1 1			1 1	十	+	+	H	十	+	十	+			
WAA-05-AF-PS-20150128	1/28/15		i			#	1		\sqcap			1.1	+	+	+		+	+	+	+			
	1	10:25	Filter	Air	1	H	X		1		X X	1 1	+	+	+	+	+	+	+	+			
WAA-00-AF-FB-20150128	1/28/15	NA	Filter	Air	1	H	X	Х	۲	X 3	X X	++	+	+	+	++	-	+	+	+			
tn	 	<u> </u> '	-		<u> </u>	$oldsymbol{H}$	+	\vdash	₩'	$\vdash \vdash$	+	++	+	+	+	+		4	4	1			
	<u> </u>	<u> </u>			-	++	+	\vdash	₩'	++	+	\dashv	\dashv	+	4	+	_						
	 '			↓	<u> </u>	#	—	igspace	-'	-	+	$\downarrow \downarrow$	\dashv	4	\bot	1-1	-						
·	<u> </u>	<u> </u>		<u> </u>	<u> </u>	\coprod		igspace	ـــــــــــــــــــــــــــــــــــــ	\coprod	4	\coprod		\perp	\perp	$\perp \downarrow$							
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						Ш			\perp					\perp			ΙΙ	.]	<u>T</u> -				
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=	NaOH; 6=	Other																					
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Please I Comments Section if the lab is to dispose of the sample.	_ist any EP	A Waste C	odes for the	e sample	₃ in the	S	₃amp	le Di	ispo) laac	A fee	e may	j be a	asse	ssed	if sa	ample	es ar	e re	taine	ed longer than 1 month)		
☑Non-Hazard ☐Hammable ☐Skin Irritant	Poison	В	Unkno	wn		\Box		Return	n to C	lient			Dispo	osal by	y Lab			∏Arch	hive f	or	Months		
Special Instructions/QC Requirements & Comments:																			•				
Custody Seals Intact:	Custody S	Seal No.:							Co	oler T	Temp.	(°C):	Obs'd	l:		Cc	orr'd:			T'	herm ID No.:		
Relinquished by Tury Barbean	Company:			Date/Til		32AF	Reseiv	ved t	ру:	14	7	1)(*	Cg	Z.	ny:	1			Date/Time: 22-K / 132a		
Relinquished by:	Company:			Date/Ti		-	Receiv	ved I	by:		<u> </u>	<u>-×</u>			Co	mpai			estima.		Date/Time:		
Relinquished by:	Componi			Date/Ti			Coool		: n 1						+-								
	Company:			Date/ III	IIIE.		teceiv	/eu ii	III L.C	3001B	atory b	у.			100	mpar	ny:				Date/Time:		

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

Job Number: 160-10333-2

List Source: TestAmerica St. Louis Login Number: 10333

List Number: 1 Creator: Clarke, Jill C

Client: Tetra Tech EM Inc.

Creator: Clarke, Jill C		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica St. Louis

Definitions/Glossary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

Not Calculated

Quality Control

Relative error ratio

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

TestAmerica Job ID: 160-10333-2

Qualifiers

Rad

NC

ND PQL

QC

RER RL

RPD

TEF

TEQ

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
п	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)

Method Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Method	Method Description	Protocol	Laboratory
9310	Gross Alpha / Beta (GFPC)	SW846	TAL SL
GA-01-R	Cesium-137 & Other Gamma Emitters (GS)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-10333-1	WAA-01-AF-PS-20150128	Filter	01/28/15 11:12	02/02/15 13:20
160-10333-2	WAA-02-AF-PS-20150128	Filter	01/28/15 10:12	02/02/15 13:20
160-10333-3	WAA-03-AF-PS-20150128	Filter	01/28/15 10:40	02/02/15 13:20
160-10333-4	WAA-04-AF-PS-20150128	Filter	01/28/15 10:58	02/02/15 13:20
160-10333-5	WAA-05-AF-PS-20150128	Filter	01/28/15 10:25	02/02/15 13:20
160-10333-6	WAA-00-AF-FB-20150128	Filter	01/28/15 00:00	02/02/15 13:20

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Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID. 160-10333-2

Lab Sample ID: 160-10333-1

Matrix: Filter

Client Sample ID: WAA-01-AF-PS-20150128

Date Collected: 01/28/15 11:12 Date Received: 02/02/15 13:20

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	R	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.359	7	0.234	0.237	10.	0.281	pCi/Sample	02/03/15 13:35	02/03/15 20:50	1
Gross Beta	10.7		0,914	1,41	10,	0 350	pCi/Sample	02/03/15 13:35	02/03/15 20:50	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count Uncert.	Total Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+1-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.386	W	3.85	3.85	(0.0)	7.42	pCi/Sample	02/03/15 13:37	02/03/15 18.42	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None			,,			pCi/Sample	02/03/15 13:37	02/03/15 18 42	1

Client Sample ID: WAA-02-AF-PS-20150128 Lab Sample ID: 160-10333-2

Date Collected: 01/28/15 10:12 Date Received: 02/02/15 13:20 Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <i>σ+l-</i>)	(2\sigma+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.464	7	0,271	0.276	10.0	0.324	pCi/Sample	02/03/15 13:35	02/03/15 20.50	1
Gross Beta	10.3		0.902	1.37	10.0	0.371	pCi/Sample	02/03/15 13:35	02/03/15 20 50	1

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

			Count	Total						
			Uncert	Uncert.						
Analyte	Result	Qualifier	(20+/-)	(2σ+ <i>i</i> -)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-1.63	W	5 26	5.27	20.9	9.32	pCi/Sample	02/03/15 13 37	02/03/15 18:44	1
			Count	Total	_					
Other Detected			Uncerl.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None		-				pCi/Sample	02/03/15 13 37	02/03/15 18 44	1

Client Sample ID: WAA-03-AF-PS-20150128

Date Collected: 01/28/15 10:40 Date Received: 02/02/15 13:20 Lab Sample ID: 160-10333-3

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.0904	JE!	0.164	0 165	10.0	0.297	pCi/Sample	02/03/15 13 35	02/03/15 20 51	1
Gross Beta	12.9		0 998	1,53	10.0	0 370	pCi/Sample	02/03/15 13:35	02/03/15 20.51	1

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TestAmerica St Louis

Client. Tetra Tech EM Inc.

Project/Site West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Client Sample ID: WAA-03-AF-PS-20150128

Date Collected: 01/28/15 10:40 Date Received: 02/02/15 13:20

Lab Sample ID: 160-10333-3

Matrix: Filter

Method: GA-01-R - Cesium-13	7 &	Other	Gamma	Emitters	(GS)

		Count	Total						
		Uncert.	Uncert,						
Analyte	Result Qualifler	(2\sigma+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	131 🗸	4.35	4.35	20.0	7.87	pCi/Sample	02/03/15 13 37	02/03/15 18:44	1
		Count	Total						
Other Detected		Uncert.	Uncert						
Radionuclides	Result Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None					pCi/Sample	02/03/15 13:37	02/03/15 18 44	1

Client Sample ID: WAA-04-AF-PS-20150128

Date Collected: 01/28/15 10:58

Date Received: 02/02/15 13:20

Lab Sample ID: 160-10333-4

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

			Count	1014						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.334	U	0.254	0.257	10.0	0.358	pCi/Sample	02/03/15 13:35	02/03/15 20 51	1
Gross Beta	11.0		0,927	1 44	10.0	0.389	pCi/Sample	02/03/15 13:35	02/03/15 20:51	1
Group Deta			2,02.			0.000	posodinpic	02/00/10 10/02	22 da 10 2d 51	

			Count	Total						
			Uncert	Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(2 0+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	1.40		5.95	5,95	20.0	10.9	pCi/Sample	02/03/15 13 37	02/03/15 19 06	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifler	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	02/03/15 13 37	02/03/15 19.06	1

Client Sample ID: WAA-05-AF-PS-20150128

Date Collected: 01/28/15 10:25

Date Received: 02/02/15 13:20

Lab Sample ID: 160-10333-5

Matrix: Filter

Method: 9310 - Gross Alpha / Beta (GFPC)

Analyte	Result	Qualifier	Count Uncert. (20+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac											
											Gross Alpha	0.238	ill	0,235	0,236	10.0	0.362	pCi/Sample	02/03/15 13:35	02/03/15 20 51	1
											Gross Bela	10.0		0,884	1.33	10.0	0.379	pCi/Sample	02/03/15 13 35	02/03/15 20 51	1

Method: GA-01-P - Cosium-127 & Other Gamma Emitters (GS)

		Qualifier	Count Uncert. (20+/-)	Total Uncert. (20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte	Result									

HU6 25 Feb 15

TestAmerica St. Louis

Client Sample Results

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID. 160-10333-2

Client Sample ID: WAA-05-AF-PS-20150128

Date Collected: 01/28/15 10:25

Date Received: 02/02/15 13:20

Lab Sample ID: 160-10333-5

Matrix: Filter

			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+4)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None		-				pCi/Sample	02/03/15 13:37	02/03/15 19 46	1

Client Sample ID: WAA-00-AF-FB-20150128

Date Collected: 01/28/15 00:00

Date Received: 02/02/15 13:20

Lab Sample ID: 160-10333-6

Matrix: Filter

			Count Uncert	Total Uncert						
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.0974	W	0.182	0.182	(10.0)	0.328	pCi/Sample	02/03/15 13:35	02/03/15 20:51	1
Gross Beta	1.48	5	0.384	0.411	10.0	0.372	pCi/Sample	02/03/15 13 35	02/03/15 20:51	1
Method: GA-01-R -	Cesium-137 8	& Other Gan	nma Emitters	(GS)						
			Count	Total						
			Uncert.	Uncert						
Analyte	Result	Qualifier	(20+/-)	(2 a+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.000	U	4.02	4 02	20.0	9,68	pCi/Sample	02/03/15 13:37	02/03/15 19 41	1
			Count	Total						
Other Detected			Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	02/03/15 13 37	02/03/15 19 41	1
Radionuclide										

HU6 25 Feb 15

Method: 9310 - Gross Alpha / Beta (GFPC)

Lab Sample ID: MB 160-171848/1-A **Matrix: Filter**

Analysis Batch: 171819

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 171848

			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	-0.01722	U	0.124	0.124	10.0	0.297	pCi/Sample	02/03/15 13:35	02/03/15 19:22	1
Gross Beta	0.1664	U	0.221	0.221	10.0	0.370	pCi/Sample	02/03/15 13:35	02/03/15 19:22	1

Lab Sample ID: LCS 160-171848/2-A

Matrix: Filter

Analysis Batch: 171819

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 171848

Total LCS LCS %Rec. Spike Uncert. Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits Gross Alpha 5.37 5.461 1.01 10.0 0.358 pCi/Samp 102 75 - 125

Lab Sample ID: LCSB 160-171848/3-A

Matrix: Filter

Analysis Batch: 171819

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 171848

-				Total					
	Spike	LCSB	LCSB	Uncert.				%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC Unit	%Rec	Limits	
Gross Beta	17.9	18.32		2.19	10.0	0.372 pCi/	Samr 103	75 - 125	

Lab Sample ID: 160-10333-1 DU

Matrix: Filter

Analysis Batch: 171817

Client Sample ID: WAA-01-AF-PS-20150128

Prep Type: Total/NA

Prep Batch: 171848

Total Sample Sample DU DU Uncert. RER RL MDC Unit Analyte Result Qual Result Qual $(2\sigma + / -)$ RER Limit 10.0 Gross Alpha 0.359 0.3520 0.250 0.324 pCi/Samp 0.01 Gross Beta 10.7 11.41 1.48 10.0 0.371 pCi/Samp 0.24

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-171851/1-A

Matrix: Filter

Radionuclide

Client Sample ID: Method Blank

Prep Type: Total/NA

Analysis Batch: 1/18//	•								Prep Batch:	171851
			Count	Total						
	MB	MB	Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-3.554	U	24.9	24.9	20.0	15.3	pCi/Sample	02/03/15 13:37	02/03/15 18:42	1
			Count	Total						
Other Detected	MB	MB	Uncert.	Uncert.						
Radionuclides	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected	None						pCi/Sample	02/03/15 13:37	02/03/15 18:42	1

QC Sample Results

Client: Tetra Tech EM Inc.

Matrix: Filter

Project/Site: West Lake Landfill - Filters

Lab Sample ID: LCS 160-171851/2-A

TestAmerica Job ID: 160-10333-2

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Method: GA-01-R - Cesium-137 & Other Gamma Emitters (GS) (Continued)

Analysis Batch: 171879									Prep Batch:	171851
				Total						
	Spike	LCS	LCS	Uncert.					%Rec.	
Analyte	Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Americium-241	32000	31400		3270		117	pCi/Samp	98	87 _ 116	
Cesium-137	11100	10780		1130	20.0	64.4	pCi/Samp	97	87 _ 120	
Cobalt-60	11700	11610		1170		40.7	pCi/Samp	99	87 ₋ 115	

Lab Sample ID: 160-10333-1 DU Client Sample ID: WAA-01-AF-PS-20150128

Matrix: Filter Prep Type: Total/NA Analysis Batch: 171882 **Prep Batch: 171851**

Total Sample Sample DU DU Uncert. RER Analyte Result Qual Result Qual (2σ+/-) RL MDC Unit RER Limit Cesium-137 -0.386 U 0.9008 U 20.0 7.21 pCi/Samp 0.17 3.92 Total Other Detected DU DU Sample Sample Uncert. RER (2σ+/-) Radionuclides Result Qual Result Qual RL MDC Unit RER Limit pCi/Samp Other Detected None None Radionuclide

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QC Association Summary

Client: Tetra Tech EM Inc.

Project/Site: West Lake Landfill - Filters

TestAmerica Job ID: 160-10333-2

Rad

Prep Batch: 171848

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10333-1	WAA-01-AF-PS-20150128	Total/NA	Filter	None	
160-10333-1 DU	WAA-01-AF-PS-20150128	Total/NA	Filter	None	
160-10333-2	WAA-02-AF-PS-20150128	Total/NA	Filter	None	
160-10333-3	WAA-03-AF-PS-20150128	Total/NA	Filter	None	
160-10333-4	WAA-04-AF-PS-20150128	Total/NA	Filter	None	
160-10333-5	WAA-05-AF-PS-20150128	Total/NA	Filter	None	
160-10333-6	WAA-00-AF-FB-20150128	Total/NA	Filter	None	
LCS 160-171848/2-A	Lab Control Sample	Total/NA	Filter	None	
LCSB 160-171848/3-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-171848/1-A	Method Blank	Total/NA	Filter	None	

Prep Batch: 171851

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-10333-1	WAA-01-AF-PS-20150128	Total/NA	Filter	None	
160-10333-1 DU	WAA-01-AF-PS-20150128	Total/NA	Filter	None	
160-10333-2	WAA-02-AF-PS-20150128	Total/NA	Filter	None	
160-10333-3	WAA-03-AF-PS-20150128	Total/NA	Filter	None	
160-10333-4	WAA-04-AF-PS-20150128	Total/NA	Filter	None	
160-10333-5	WAA-05-AF-PS-20150128	Total/NA	Filter	None	
160-10333-6	WAA-00-AF-FB-20150128	Total/NA	Filter	None	
LCS 160-171851/2-A	Lab Control Sample	Total/NA	Filter	None	
MB 160-171851/1-A	Method Blank	Total/NA	Filter	None	

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Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:

West Lake Landfill Site, Bridgeton, Missouri

Laboratory:	Pace Analytical Services, Inc. (Lenexa, Kansas)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 24, 2015
Sample Delivery Group (SDG):	60187128
Sample Numbers:	WAA-01-RV-PS-20150128, WAA-02-RV-PS-20150128, WAA-03-RV-PS-20150128, WAA-04-RV-PS-20150128, WAA-04-RV-DU-20150128, WAA-05-RV-PS-20150128, and WAA-00-RV-TB-20150128
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data parthat were found, and data qualifications.	o the U.S. Environmental Protection Agency (EPA) Region 7 ratory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	24 February 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) 60187128 included five (5) environmental air (adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for selected volatile organic compounds via EPA Air Method TO-17. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) field blank. The field blank yielded a low concentration of m+p-xylenes. All other field samples yielded considerably higher concentrations so no qualifications were applied.

IV. Laboratory Control Sample (LCS)

All LCS results were within QC limits. No qualifications were applied.

V. Surrogates

All surrogate recoveries were within QC limits. No qualifications were applied.

VI. Comments

No analytes were detected in the field samples.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.





February 13, 2015

Emily Fisher TETRA TECH EMI 415 Oak Kansas City, MO 64106

RE: Project: WESTLAKE LANDFILL Pace Project No.: 60187128

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on January 29, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Shui Bosenstande

Sherri Rosenstangle sherri.rosenstangle@pacelabs.com Project Manager

Enclosures



9608 Loiret Blvd. Lenexa, KS 66219 (913)599-5665



CERTIFICATIONS

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

A2LA Certification #: 2926.01 Alaska Certification #: UST-078 Alaska Certification #MN00064 Alabama Certification #40770 Arizona Certification #: AZ-0014 Arkansas Certification #: 88-0680 California Certification #: 01155CA Colorado Certification #Pace Connecticut Certification #: PH-0256

EPA Region 8 Certification #: 8TMS-L Florida/NELAP Certification #: E87605

Guam Certification #:14-008r Georgia Certification #: 959 Georgia EPD #: Pace

Idaho Certification #: MN00064 Hawaii Certification #MN00064 Illinois Certification #: 200011 Indiana Certification#C-MN-01 Iowa Certification #: 368

Kansas Certification #: E-10167 Kentucky Dept of Envi. Protection - DW #90062 Kentucky Dept of Envi. Protection - WW #:90062

Louisiana DEQ Certification #: 3086 Louisiana DHH #: LA140001 Maine Certification #: 2013011 Maryland Certification #: 322 Michigan DEPH Certification #: 9909

Minnesota Certification #: 027-053-137 Mississippi Certification #: Pace Montana Certification #: MT0092 Nevada Certification #: MN_00064 Nebraska Certification #: Pace New Jersey Certification #: MN-002 New York Certification #: 11647 North Carolina Certification #: 530

North Carolina State Public Health #: 27700

North Dakota Certification #: R-036

Ohio EPA #: 4150 Ohio VAP Certification #: CL101 Oklahoma Certification #: 9507 Oregon Certification #: MN200001 Oregon Certification #: MN300001 Pennsylvania Certification #: 68-00563

Puerto Rico Certification Saipan (CNMI) #:MP0003 South Carolina #:74003001 Texas Certification #: T104704192 Tennessee Certification #: 02818 Utah Certification #: MN000642013-4 Virginia DGS Certification #: 251 Virginia/VELAP Certification #: Pace Washington Certification #: C486 West Virginia Certification #: 382 West Virginia DHHR #:9952C

Wisconsin Certification #: 999407970



SAMPLE SUMMARY

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60187128001	WAA-01-RV-PS-20150128	Air	01/28/15 14:02	01/29/15 09:35
60187128002	WAA-02-RV-PS-20150128	Air	01/28/15 13:21	01/29/15 09:35
60187128003	WAA-03-RV-PS-20150128	Air	01/28/15 13:39	01/29/15 09:35
60187128004	WAA-04-RV-PS-20150128	Air	01/28/15 13:53	01/29/15 09:35
60187128005	WAA-05-RV-PS-20150128	Air	01/28/15 13:29	01/29/15 09:35
60187128006	WAA-04-RV-DU-20150128	Air	01/28/15 13:53	01/29/15 09:35
60187128007	WAA-00-RV-TB-20150128	Air	01/28/15 14:09	01/29/15 09:35

(913)599-5665



SAMPLE ANALYTE COUNT

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60187128001	WAA-01-RV-PS-20150128	TO-17M	RTP	13	PASI-M
60187128002	WAA-02-RV-PS-20150128	TO-17M	RTP	13	PASI-M
60187128003	WAA-03-RV-PS-20150128	TO-17M	RTP	13	PASI-M
60187128004	WAA-04-RV-PS-20150128	TO-17M	RTP	13	PASI-M
60187128005	WAA-05-RV-PS-20150128	TO-17M	RTP	13	PASI-M
60187128006	WAA-04-RV-DU-20150128	TO-17M	RTP	13	PASI-M
60187128007	WAA-00-RV-TB-20150128	TO-17M	RTP	13	PASI-M



Project.

WESTLAKE LANDFILL

Pace Project No .

60187128

Sample: WAA-01-RV-PS-20150128	Lab ID: 6	0187128001	Collected: 01/28	/15 14:02	Received, 01	/29/15 09:35 N	Natrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
TO17M VOC MS AIR Passive	Analytical M	ethod: TO-17	M Preparation Meth	iod: TO-1	7M			
cis-1,2-Dichloroethene	ND	ug/m3	0.074	1	02/06/15 06:41	02/06/15 21:51	156-59-2	
trans-1,2-Dichloroethene	ND	ug/m3	0.074	1	02/06/15 06:41	02/06/15 21:51	156-60-5	
Ethylbenzene	0.32	ug/m3	0.074	1	02/06/15 06:41	02/06/15 21:51	100-41-4	
sopropylbenzene (Cumene)	ND	ug/m3	0.19	1	02/06/15 06:41	02/06/15 21:51	98-82-8	
Methyl-tert-butyl ether	ND	ug/m3	0.074	1	02/06/15 06:41	02/06/15 21:51	1634-04-4	
Tetrachloroethene	0.27	ug/m3	0.19	1	02/06/15 06:41	02/06/15 21:51	127-18-4	
Frichloroethene	ND	ug/m3	0.19	1	02/06/15 06:41	02/06/15 21:51	79-01-6	
1,2,4-Trimethylbenzene	0.26	ug/m3	D 19	1	02/06/15 06:41	02/06/15 21:51	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/m3	0.19	1	02/06/15 06:41	02/06/15 21:51	108-67-8	
/inyl chloride	ND	ug/m3	0.074	. 1	02/06/15 06:41	02/06/15 21:51	75-01-4	
n&p-Xylene		ug/m3	0.15	1	02/06/15 06.41	02/06/15 21:51	179601-23-1	
o-Xylene Surrogates		ug/m3	0.074	. 1	02/06/15 06:41	02/06/15 21:51	95-47-6	
Chlorobenzene-d5 (S)	107	%.		1	02/06/15 06:41	02/06/15 21.51	3114-55-4	

HUG 24 Februs 2915



Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Sample: WAA-02-RV-PS-20150128	Lab ID: 6018	7128002	Collected. 01/28/	15 13·21	Received 01	/29/15 09:35 M	latrix: Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qua
TO17M VOC MS AIR Passive	Analytical Meth	od; TO-17N	Preparation Meth	od: TO-1	7M			
cis-1,2-Dichloroethene	ND ug/	m3	0.074	1	02/06/15 06:41	02/06/15 22.22	156-59-2	
rans-1,2-Dichloroethene	ND ug/	m3	0.074	1	02/06/15 06:41	02/06/15 22:22	156-60-5	
Ethylbenzene	0.31 ug/	/m3	0.074	1	02/06/15 06:41	02/06/15 22:22	100-41-4	
sopropylbenzene (Cumene)	ND ug/	/m3	0.19	1	02/06/15 06:41	02/06/15 22:22	98-82-8	
Methyl-tert-butyl ether	ND ug/	/m3	0.074	1	02/06/15 06:41	02/06/15 22:22	1634-04-4	
etrachloroethene	0.46 ug/	/m3	0.19	1	02/06/15 06:41	02/06/15 22:22	127-18-4	
Trichloroethene	0.51 ug/	/m3	0.19	1	02/06/15 06:41	02/06/15 22:22	79-01-6	
,2,4-Trimethylbenzene	0.27 ug/	/m3	0.19	1	02/06/15 06:41	02/06/15 22.22	95-63-6	
,3,5-Trimethylbenzene	ND ug/	/m3	0.19	1	02/06/15 06:41	02/06/15 22:22	108-67-8	
/inyl chloride	ND ug/	/m3	0.074	1	02/06/15 06:41	02/06/15 22:22	75-01-4	
n&p-Xylene	0.96 ug/	/m3	0.15	1	02/06/15 06:41	02/06/15 22:22	179601-23-1	
o-Xylene	0.33 ug/	/m3	0.074	1	02/06/15 06:41	02/06/15 22:22	95-47-6	
Surrogates								
Chlorobenzene-d5 (S)	106 %.			1	02/06/15 06:41	02/06/15 22:22	3114-55-4	

HOE 24 Feb 15



Project

WESTLAKE LANDFILL

Pace Project No.:

Date: 02/13/2015 05:38 PM

60187128

Sample: WAA-03-RV-PS-20150128	Lab ID: 60	187128003	Collected, 01/	28/15 1	3:39	Received: 01	1/29/15 09:35 N	/latrix: Air	
Parameters	Results	Units	Report Lim	it C)F	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Me	thod: TO-17	M Preparation M	ethod.	TO-17	7 M			
cis-1,2-Dichloroethene	ND t	ıg/m3	0.0	74	1	02/06/15 06.41	02/06/15 22:53	156-59-2	
trans-1,2-Dichloroethene	ND (ıg/m3	0.0	74	1	02/06/15 06:41	02/06/15 22:53	156-60-5	
Ethylbenzene	0.29 ι	ig/m3	0.0	74	1	02/06/15 06:41	02/06/15 22:53	100-41-4	
Isopropylbenzene (Cumene)	ND t	ig/m3	0.	19	1	02/06/15 06:41	02/06/15 22:53	98-82-8	
Methyl-tert-butyl ether	ND t	ıg/m3	0.0	74	1	02/06/15 06:41	02/06/15 22:53	1634-04-4	
Tetrachloroethene	ND t	ıg/m3	0.	19	1	02/06/15 06:41	02/06/15 22:53	127-18-4	
Trichtoroethene	ND t	ıg/m3	0.	19	1	02/06/15 06:41	02/06/15 22:53	79-01-6	
1,2,4-Trimethylbenzene	0.32 (ıg/m3	0.	19	1	02/06/15 06:41	02/06/15 22:53	95-63-6	
1,3,5-Trimethylbenzene	ND i	ıg/m3	0.	19	1	02/06/15 06:41	02/06/15 22:53	108-67-8	
Vinyl chloride	ND t	ıg/m3	0.0	74	1	02/06/15 06:41	02/06/15 22:53	75-01-4	
m&p-Xylene	0.89 i	-	0.	15	1	02/06/15 06:41	02/06/15 22:53	179601-23-1	
o-Xylene Surrogates	0.30	•	0.0	74	1	02/06/15 06:41	02/06/15 22:53	95-47-6	
Chlorobenzene-d5 (S)	113 4	% .			1	02/06/15 06:41	02/06/15 22:53	3114-55-4	



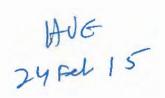


Project:

WESTLAKE LANDFILL

Pace Project No.: 60187128

Sample: WAA-04-RV-PS-20150128	Lab ID: 601	87128004	Collected: 01/2	1/15 13:53	Received: 01	/29/15 09:35 N	fatrix. Air	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
TO17M VOC MS AIR Passive	Analytical Met	hod: TO-17N	Preparation Met	hod: TO-	17M			
cis-1,2-Dichloroethene	ND ug	g/m3	0 07	1 1	02/06/15 06:41	02/06/15 23:25	156-59-2	
trans-1,2-Dichloroethene	ND ug	g/m3	0.07	1 1	02/06/15 06:41	02/06/15 23:25	156-60-5	
Ethylbenzene	0.31 ug	g/m3	0.07	4 1	02/06/15 06:41	02/06/15 23:25	100-41-4	
sopropyibenzene (Cumene)	ND ug	g/m3	0.1	1	02/06/15 06:41	02/06/15 23:25	98-82-8	
Methyl-tert-butyl ether	ND ug	g/m3	0.07	1 1	02/06/15 06:41	02/06/15 23:25	1634-04-4	
Tetrachloroethene	ND us	g/m3	0.1	3 1	02/06/15 06:41	02/06/15 23:25	127-18-4	
Trichloroethene	ND us	g/m3	0.1	9 1	02/06/15 06:41	02/06/15 23:25	79-01-6	
1,2,4-Trimethylbenzene	0.35 ug	g/m3	0.1	9 1	02/06/15 06:41	02/06/15 23:25	95-63-6	
1,3,5-Trimethylbenzene	ND u	g/m3	0.1	9 1	02/06/15 06:41	02/06/15 23:25	108-67-8	
Vinyl chloride	ND u	g/m3	0.07	4 1	02/06/15 06:41	02/06/15 23:25	75-01-4	
m&p-Xylene	0.91 ug	g/m3	0.1	5 1	02/06/15 06:41	02/06/15 23:25	179601-23-1	
o-Xylene Surrogates	0.31 u ₁	g/m3	0.07	4 1	02/06/15 06:41	02/06/15 23:25	95-47-6	
Chlorobenzene-d5 (S)	109 %	,).		1	02/06/15 06:41	02/06/15 23:25	3114-55-4	

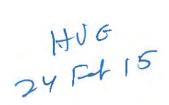




Project: WESTLAKE LANDFILL

Pace Project No. 60187128

Sample: WAA-05-RV-PS-20150128	Lab ID: 601871286	05 Collected: 01/28/1	5 13:29	Received: 01	/29/15 09:35 N	latrix Air	
Parameters	Results Ur	its Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Method: To	0-17M Preparation Metho	d. TO-1	7М			
cis-1,2-Dìchloroethene	ND ug/m3	0.074	1	02/06/15 06.41	02/06/15 23:57	156-59-2	
trans-1,2-Dichloroethene	ND ug/m3	0.074	1	02/06/15 06:41	02/06/15 23:57	156-60-5	
Ethylbenzene	0.37 ug/m3	0.074	1	02/06/15 06:41	02/06/15 23:57	100-41-4	
sopropylbenzene (Cumene)	ND ug/m3	0.19	1	02/06/15 06:41	02/06/15 23:57	98-82-8	
Methyl-tert-butyl ether	ND ug/m3	0.074	1	02/06/15 06:41	02/06/15 23:57	1634-04-4	
Tetrachloroethene	0.23 ug/m3	0.19	1	02/06/15 06:41	02/06/15 23:57	127-18-4	
Trichloroethene	ND ug/m3	0.19	1	02/06/15 06:41	02/06/15 23:57	79-01-6	
1,2,4-Trimethylbenzene	0.4 5 ug/m3	0.19	1	02/06/15 06:41	02/06/15 23:57	95-63-6	
1,3,5-Trimethylbenzene	ND ug/m3	0.19	1	02/06/15 06:41	02/06/15 23:57	108-67-8	
Vinyl chloride	ND ug/m3	0 074	1	02/06/15 06:41	02/06/15 23:57	75-01-4	
m&p-Xylene	1.1 ug/m3	0.15	1	02/06/15 06:41	02/06/15 23:57	179601-23-1	
o-Xylene Surrogates	0.39 ug/m3	0.074	1	02/06/15 06:41	02/06/15 23:57	95-47-6	
Chlorobenzerie-d5 (S)	111 %.		1	02/06/15 06:41	02/06/15 23:57	3114-55-4	



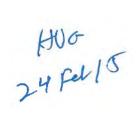


Project:

WESTLAKE LANDFILL

Pace Project No.: 60187128

Sample: WAA-04-RV-DU-20150128	Lab ID: 601	87128006	Collected:	01/28/1	5 13.53	Received: 01	/29/15 09:35 N	latrix: Air	
Parameters	Results	Units	Report	Limit _	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Meth	nod: TO-178	M Preparation	n Metho	d: TO-11	7М			
cis-1,2-Dichloroethene	ND ug	/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	156-59-2	
trans-1,2-Dichloroethene	ND ug	/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	156-60-5	
Ethylbenzene	0.28 ug	/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	100-41-4	
Isopropylbenzene (Cumene)	ND ug	/m3		0 19	1	02/06/15 06:41	02/07/15 00:29	98-82-8	
Methyl-tert-butyl ether	ND ug	/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	1634-04-4	
Tetrachloroethene	ND ug	/m3		0.19	1	02/06/15 06:41	02/07/15 00:29	127-18-4	
Trichloroethene	ND ug	/m3		0.19	1	02/06/15 06:41	02/07/15 00.29	79-01-6	
1,2,4-Trimethylbenzene	0.25 ug	/m3		0.19	1	02/06/15 06:41	02/07/15 00:29	95-63-6	
1,3,5-Trimethylbenzene	ND ug	/m3		0.19	1	02/06/15 06:41	02/07/15 00:29	108-67-8	
Vinyl chloride	ND ug	/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	75-01-4	
m&p-Xylene	0.84 ug	/m3		0.15	1	02/06/15 06:41	02/07/15 00:29	179601-23-1	
o-Xylene Surrogates	0.29 ug	j/m3		0.074	1	02/06/15 06:41	02/07/15 00:29	95-47-6	
Chlorabenzene-d5 (S)	111 %				1	02/06/15 06:41	02/07/15 00:29	3114-55-4	



(913)599-5665



ANALYTICAL RESULTS

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Date: 02/13/2015 05:38 PM

Sample: WAA-00-RV-TB-20150128	Lab ID: 60187128007	Collected: 01/28/	15 14:09	Received: 01	/29/15 09:35 N	Matrix: Air	
Parameters	Results Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
TO17M VOC MS AIR Passive	Analytical Method: TO-1	7M Preparation Metho	od: TO-1	7M			
cis-1,2-Dichloroethene	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	156-59-2	
trans-1,2-Dichloroethene	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	156-60-5	
Ethylbenzene	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	100-41-4	
sopropylbenzene (Cumene)	ND ug/m3	0.19	1	02/06/15 06:41	02/07/15 01:01	98-82-8	
Methyl-tert-butyl ether	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	1634-04-4	
Tetrachloroethene	ND ug/m3	0.19	1	02/06/15 06:41	02/07/15 01:01	127-18-4	
Trichloroethene	ND ug/m3	0.19	1	02/06/15 06:41	02/07/15 01:01	79-01-6	
1,2,4-Trimethylbenzene	ND ug/m3	0.19	1	02/06/15 06:41	02/07/15 01:01	95-63-6	
1,3,5-Trimethylbenzene	ND ug/m3	0.19	1	02/06/15 06:41	02/07/15 01:01	108-67-8	
Vinyl chloride	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	75-01-4	
m&p-Xylene	0.21 ug/m3	0.15	1	02/06/15 06:41	02/07/15 01:01	179601-23-1	
o-Xylene	ND ug/m3	0.074	1	02/06/15 06:41	02/07/15 01:01	95-47-6	
Surrogates	· ·						
Chlorobenzene-d5 (S)	105 %.		1	02/06/15 06:41	02/07/15 01:01	3114-55-4	



QUALITY CONTROL DATA

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Date: 02/13/2015 05:38 PM

QC Batch: AIR/22462 Analysis Method: TO-17M
QC Batch Method: TO-17M Analysis Description: TO17 MSS AIR

Associated Lab Samples: 60187128001, 60187128002, 60187128003, 60187128004, 60187128005, 60187128006, 60187128007

METHOD BLANK: 1896384 Matrix: Air

Associated Lab Samples: 60187128001, 60187128002, 60187128003, 60187128004, 60187128005, 60187128006, 60187128007

		Blank	Reporting		
Parameter	Units	Result	Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	ND ND	0.19	02/06/15 15:15	
1,3,5-Trimethylbenzene	ug/m3	ND	0.19	02/06/15 15:15	
cis-1,2-Dichloroethene	ug/m3	ND	0.074	02/06/15 15:15	
Ethylbenzene	ug/m3	ND	0.074	02/06/15 15:15	
Isopropylbenzene (Cumene)	ug/m3	ND	0.19	02/06/15 15:15	
m&p-Xylene	ug/m3	ND	0.15	02/06/15 15:15	
Methyl-tert-butyl ether	ug/m3	ND	0.074	02/06/15 15:15	
o-Xylene	ug/m3	ND	0.074	02/06/15 15:15	
Tetrachloroethene	ug/m3	ND	0.19	02/06/15 15:15	
trans-1,2-Dichloroethene	ug/m3	ND	0.074	02/06/15 15:15	
Trichloroethene	ug/m3	ND	0.19	02/06/15 15:15	
Vinyl chloride	ug/m3	ND	0.074	02/06/15 15:15	
Chlorobenzene-d5 (S)	%.	97		02/06/15 15:15	

LABORATORY CONTROL SAMPLE:	1896385					
		Spike	LCS	LCS	% Rec	
Parameter	Units	Conc.	Result	% Rec	Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/m3	118	127	108	70-130	
1,3,5-Trimethylbenzene	ug/m3	118	123	105	70-130	
cis-1,2-Dichloroethene	ug/m3	79.6	87.5	110	70-130	
Ethylbenzene	ug/m3	88.5	90.3	102	70-130	
Isopropylbenzene (Cumene)	ug/m3	98.4	105	107	70-130	
m&p-Xylene	ug/m3	85.3	90.7	106	70-130	
Methyl-tert-butyl ether	ug/m3	63.1	81.7	129	70-130	
o-Xylene	ug/m3	92.1	96.4	105	70-130	
Tetrachloroethene	ug/m3	139	147	106	70-130	
trans-1,2-Dichloroethene	ug/m3	79.6	89.3	112	70-130	
Trichloroethene	ug/m3	104	117	113	70-130	
Vinyl chloride	ug/m3	51.5	54.9	107	70-130	
Chlorobenzene-d5 (S)	%.			101		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.



QUALIFIERS

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

Date: 02/13/2015 05:38 PM

PASI-M Pace Analytical Services - Minneapolis

(913)599-5665



QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WESTLAKE LANDFILL

Pace Project No.: 60187128

Date: 02/13/2015 05:38 PM

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60187128001	WAA-01-RV-PS-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128002	WAA-02-RV-PS-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128003	WAA-03-RV-PS-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128004	WAA-04-RV-PS-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128005	WAA-05-RV-PS-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128006	WAA-04-RV-DU-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463
60187128007	WAA-00-RV-TB-20150128	TO-17M	AIR/22462	TO-17M	AIR/22463

87	Document N Air Sample Condition		Document Revised: 26De Page 1 of 1	2013
/ Pace Analytical*	Document F-MN-A-106-		lssuing Authority: Pace Minnesota Quality (Office
Upon Receipt Client Name: Pace KS	Pr	oject WO#	:6018712	28
Courier: Fed Ex UPS Commercial Pace 772746587	USPS Clie Other: 678	6018712	28	
Custody Seal on Cooler/Box Present? Yes	□No Seals Inta	ct? ∕☐Yes ☐No	Optional: Proj. Due Date:	Proj. Name:
acking Material: Bubble Wrap Bubble	Bags Foam None	Other:	Temp	Blank rec: Yes 🔲 N
emp. (TO17 and TO13 samples only) (°C): 5, 2 Temp should be above freezing to 6°C Correction Facure of ice Received Blue Wet None			B88A912167504 B88A9132521491 Person Examining Contents:	□72337080 □80512447 €2 (2 9 15
pe of ice vectored Dates A Met Divolle			: Comments:	
Chaln of Custody Present?	☑Yes □No	□n/a 1.		
Chain of Custody Filled Out?		□N/A 2.		
Chain of Custody Relinquished?	☐Yes ☐No	□N/A 3.		
Sampler Name and/or Signature on COC?	☑Yes ☐No	□N/A 4.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Samples Arrived within Hold Time?	Yes No	□n/A 5.		
Short Hold Time Analysis (<72 hr)?	Yes ☑No	□n/a 6.		
Rush Turn Around Time Requested?	□Yes □No	□N/A 7,		
Sufficient Volume?				
Correct Containers Used?	√Yes □No	□N/A 9.	10	
-Pace Containers Used?		□N/A		
Containers Intact?		□N/A 10.		
Media: 1017 PUSSIVE		11.		
Sample Labels Match COC?	Yes No	□N/A 12.		
Samples Received:				
Canisters	Flow Co	ntrollers	Stand A	Mone G
Sample Number Can ID	Sample Number	Can ID	Sample Number	Can ID
	2000-000-			
		1		
4				
- 112				
	2			
		<i>c</i>		
LIENT NOTIFICATION/RESOLUTION			Field Data Required?	Typs TNo
Person Contacted:		Date/Time:	rield Data Nequileu:	
Comments/Resolution:		- Sacry Hiller		
community recording				180
	27			/
)		1001/	
roject Manager Review:		Date:	10411	

hold, incorrect preservative, out of temp, incorrect containers)

Page 15 of 16



CHAIN-OF-CUSTODY / Analytical Request Document The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

	d Client Information;	Section B Required F	Project					Invo	tion C ice Inform	ation:								Page: 1 of 1						
Compar		Report To:	Emily	Fisher					Attention: Emily Fisher															
Address	: 415 Oak	Copy To:						Com	Company Name: Tetra Tech						REGULATORY AGENCY									
	Kansas City, MO 64106							Addı	Address: 415 Oak St, Kansas City, MO 64106						T NPDES T GROUND WATER T DRINKING W					WATER				
Email To	: Emily.Fisher@tetratech.com	Purchase C	Order No	D.: 11114	99			Page	Pace Quote Reference:						ST	┌ R	RCRA		Г	OTHER				
Phone:	(816) 412-1755 Fax:	Project Nan	ne: \	Vest Lake	Landfill				Project	Sherri Rosenstang	le			Site	Location	1								
Reques	ted Due Date/TAT:	Project Nun	nber:						Profile #:	970.8				1	STATE:	_	MC							
											0.5	Re	queste	Analys	is Filte	red (Y	(/N)	1						
	Section D Valid Matrix C Required Client Information MATRIX	odes CODE	gg g	EMP)	COLL	ECTED			뿔		NIN.		TT			П								
	DRINKING WATER WATER	DW WT	as l	C-COMP)	COLL	T		SH.	IRA I			1	+	++	+		Tunne							
	WASTE WATER PRODUCT SOIL/SOLID OIL	P SL OL' WP		Geograph Control of the Control of t	ING END E/TIME	SAMPLING DATE/T	IME END	ME (WIN	TUBE SERIAL		TI IDE SEDIAL		TIDE SEDIA		TIPE SEDIAL						2			
##	SAMPLE ID WPE AR AR AR AR AR AR AR AR AR AR AR AR AR	AR OT TS	CODE	7PE				TOTAL SAMPLING TIME (MINUTES)	AVERAGE SAMPLING TEMPERATURE (°C)	NUMBER	Analysis Test	TO-17 Passive			14			Residual Chlorine (Y/N)						
ITEM			MAT	SAMPLE SAMPLE	TIME	DATE	TIME	10TA	\$ S		1	0						%	Pac	Project N	lo./ Lab l.D.			
19	WAA-01-RV-PS-20150128		AR	1/19/1		1/28/15	14:02	12961	3.3	208FG		х						\sqcap						
2	WAA-02-RV-PS-20150128		AR	1/19/1	13:14	1/28/15	13:21	12967	3.3	209FG	23,0	x												
3	WAA-03-RV-PS-20150128		AR	1/19/1	13:40	1/28/15	13:39	12959	3,3	210FG		х		TT										
4	WAA-04-RV-PS-20150128		AR	1/19/1	13:52	1/28/15	13:53	12961	3.3	211FG		х												
5	WAA-05-RV-PS-20150128		AR	1/19/1:	13:20	1/28/15	13:29	12969	3,3	212FG	4	х						α						
6	WAA-04-RV-DU-20150128		AR	1/19/1	13:52	1/28/15	13:53	12961	3.3	213FG	349	х												
7	WAA-00-RV-TB-20150128		AR	1/19/1	13:00	1/28/15	14:09	NA	NA	782BN	37	x		$\perp \perp$										
8				-			G .				100	Ц	\perp	\perp	-			11						
9			\sqcup								1,3	Н	11	44		11	_		-					
10			\sqcup		<u> </u>				-	A		Н		44	44	1-1-	1							
11			\vdash			!						Н	11	++	++	\vdash	4	\vdash						
12	A STATE OF THE STA	1	2000	and the same of th		272 - 17	C		271 111	yer attack grane e		Ш	N Tank	-	Щ.	1			1	PLE CONDIT	IAND			
CON	ADDITIONAL COMMENTS	at Hijard	10.72	IQUISHED B	Company of the		DATE	VIII. DECEMBE	TIME	ACCEPTE		J.C. 192	Q 70 Car	E 757 110	DATE	-	ME	-		LECONDIT	ONS			
		Day	oe F	instr	Ten	ra Tech	1-28	15 1	5:20	Jan.	2	24 -	e	12	MIS	104	35	5.3	7	19	7			
					* 																			
	Warran Talandari				SAMPL	ER NAME A	ND SIGNA	TURE	W-1907		i de	- 4 d	né jaya		#4.18.1		2/31/	0	5	ılar	net			
					S:018	PRINT Nam	STATE WAS	STAILER.	Darre	Kincoth	one as	+,17H,N	ne Francisco		KE TOP	redsHit	126362	ë S	N/W	Stocky (N)	se lπ (%			
Page					2	SIGNATUR			-	1			TE Signed NOD/YY):	1-2	28.	15)	Temp In	Received on Ice (Y/N)	Custody. Sealed Cooler (Y/N)	Samples Intact (Y/N)			

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	P15000232
Sample Numbers:	WAA-01-RH-PS-20150119, WAA-02-RH-PS-20150119, WAA-03-RH-PS-20150119, WAA-04-RH-PS-20150119, WAA-04-RH-DU-20150119, WAA-05-RH-PS-20150119, and WAA-00-RH-TB-20150119
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
documents entitled "Contract Labor Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pacthat were found, and data qualifications.	o the U.S. Environmental Protection Agency (EPA) Region 7 atory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was coratory QC information submitted with the project-specific data
	de to the data accorded with those documents.
Hang N. Elli	25 February 2015
Certified by Harry Ellis, Chemist	Date

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) P1500232 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

All detected results in the field samples were less than the sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these results as estimated and flagged them "J". All detected results, including the field duplicate pair, were quite similar.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270

www.alsglobal.com

LABORATORY REPORT

January 30, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on January 21, 2015. For your reference, these analyses have been assigned our service request number P1500232.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

By Sue Anderson at 11:47 am,

Sue Anderson Project Manager



the laboratory.

2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1500232

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on January 21, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact



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F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	838341
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	CA200007
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1500232

Project ID: West Lake Landfill / 103X9025140058

Date Received: 1/21/2015 Time Received: 10:05

. 110 - H2S Ai

					A Q
			Date	Time	S
Client Sample ID	Lab Code	Matrix	Collected	Collected	73
WAA-01-RH-PS-20150119	P1500232-001	Air	1/19/2015	14:01	X
WAA-02-RH-PS-20150119	P1500232-002	Air	1/19/2015	13:14	X
WAA-03-RH-PS-20150119	P1500232-003	Air	1/19/2015	13:40	X
WAA-04-RH-PS-20150119	P1500232-004	Air	1/19/2015	13:52	X
WAA-05-RH-PS-20150119	P1500232-005	Air	1/19/2015	13:20	X
WAA-04-RH-DU-20150119	P1500232-006	Air	1/19/2015	13:52	X
WAA-00-RH-TB-20150119	P1500232-007	Air	1/19/2015	13:00	X

Radiello - Chain of Custody Record & Analytical Service Request

Page 1 of 1



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

(ALS)	Fax (805) 52	6.7270		Requested Turner	numd Time in Rus	ness Bays /Surch	armes) please c	iecla	ALS Project No		·····
	. 42 (555) 52	.0-,2,0			Requested Turnaround Time in Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard						
				1 Day (100 /4) 2 Di	ay (7570) 5 Day (50	76) 4 Day (3076) .	ALS Contact:	Day-Standard		, , , , , , , , , , , , , , , , , , , ,	
Company Name & Address (Re	porting Inform	ation)		Project Name			Sue Anderson				
Tetra Tech 415 Oak Street.				West Lake Landfil	ı	Analysis:					
Kansas City, MO 64106				Project Number			(e.g. NO ₂ , SO ₂ , O ₃ , VOCs, Aldehyde,				
italisas Oity, mo 04100				103X9025140058				Ammonia)			
Project Manager				P.O. # / Credit Card	d / Billing Informatio	n		1	1		
Rob Monnig (816-412-1775) / [Dave Kinroth	(314-517-67	98)	PO 1111500	_		8			0	
Phone	Fax .			Attn: Emily Fishe	r		톡			Comments	
816-412-1775	816-410-174	8		415 Oak Street, Ka	ansas City, MO 64	106	Š		1		
Email Address for Result Reporting		+		1	**		6				
emily.fisher@tetratech.com		MIK.		emily.fisher@tetra	rtech.com		<u>10</u>				
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Time (minutes)	Sampling Temp 25°C assumed if not specified	Radiello ID Sticker Number	Hydrogen Sulfide				
WAA-01-RH-PS-20150119	0	1/5/15 @ 14:06	1/19/15 @ 14:01	20155	-1.7	262FN	×				
WAA-02-RH-PS-20150119	0	1/5/15 @ 13:09	1/19/15 @ 13:14	20165	-1.7	263FN	х				
WAA-03-RH-PS-20150119	3	1/5/15 @ 13:30	1/19/15 @ 13:40	20170	-1.7	264FN	х				
WAA-04-RH-PS-20150119	${\cal P}$	1/5/15 @ 13:43	1/19/15 @ 13:52	20169	-1.7	265FN	х				
WAA-05-RH-PS-20150119	Ó	1/5/15 @ 13:19	1/19/15 @ 13:20	20161	-1.7	266FN	×				
WAA-04-RH-DU-20150119	9	1/5/15 @ 13:43	1/19/15 @ 13:52	20169	-1.7	267FN	x				
WAA-00-RH-TB-20150119	Ø	1/5/15 @ 14:15	1/19/15 @ 13:00	NA	NA	268FN	х				
Report Tier Levels - please select one Tier I - (Results/Default if not specified) Tier II (Data Validation P Tier II (Results + QC) Tier V (client specified)			ackage) 10% Surch		EDD required Ye		Chain of Custoc	ty Seal: (Circle) KEN ABSENT	Project Requirements (MRLs, Q	APP)	
Reliquished by; (Signature)	int	<u></u>	Date: 1-21-15	Time: 1132	Received i	by: (Signature)	Noy	Date:	Time:		
	Tomp		Date:	Time:	Received	oy: (Signature)	2	Date: /21/15	Time: 0935	\sim	
Reliquished by: (Signature)			Date:	Time:	Received I	oy: (Signature)		Date:	Time:	Cooler / Blank Temperature \\O'C	

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, Ir		~ ~~~			Work order:	P1500232			
-		indfill / 103X90251400)58	,	Data anamada	1/01/15	1	ADAU	ID	
_	s) received on:		7D1 C.1. C		Date opened:		_ by:	ADAV		<u> </u>
	<i>lote:</i> This form is used for <u>all</u> samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.									
omphance	or nonconformity.	. Thermal preservation and j	on will only be e	valuated either at	the request of the	e chent and/or as rec	uired by the metho	Yes	<u>No</u>	N/A
1	Were sample	containers properly m	arked with cli	ent sample ID	?			X		
2	2 Container(s) supplied by ALS?									
3	* *	ontainers arrive in goo	od condition?					X		
4	Were chain-o	f-custody papers used	and filled out	?				X		
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X		
6	_	v olume received adequ		• • •				\times		
7	_	within specified holding	-					X		
8	_	emperature (thermal p		f cooler at rece	eipt adhered t	xo?				X
		nperature: 10° C Bla			1					
9		ank received?						X		
10	_	seals on outside of co	oler/Box?					X		
	, , , , , , , , , , , , , , , , , , ,	Location of seal(s)?					Sealing Lid?	X		
	Were signatur	re and date included?						X		
	Were seals int							X		
		seals on outside of sar	nple container	?					X	
		Location of seal(s)?	_				Sealing Lid?			X
	Were signatur	re and date included?								×
	Were seals int									X
11		ers have appropriate pr	eservation a	cording to me	ethod/SOP or	Client specified	information?			×
		ent indication that the si		•		эр сонгос				×
		vials checked for presen	_							$\overline{\mathbf{x}}$
		nt/method/SOP require			mnle nH and	if necessary alte	r it?			×
12	Tubes:	Are the tubes capp	-		inpic pri and	ii iiccessary and	1 10:	\boxtimes		
12	Tubes.									
10	D 1	Do they contain m		1: , ,0					\boxtimes	
13	Badges:	Are the badges pro								X
		Are dual bed badg	es separated a	ind individuall	y capped and	intact?				X
Lab	Sample ID	Container	Required	Received	Adjusted	VOA Headspac	e Recei	pt / Pres	ervation	l
		Description	pH *	pН	pН	(Presence/Absence		Commer	nts	
P1500232		Passive (Radiello H2S)						· · · · · · · · · · · · · · · · · · ·		
P1500232		Passive (Radiello H2S)								
P1500232		Passive (Radiello H2S)								
P1500232		Passive (Radiello H2S)								
	P1500232-005.01 Passive (Radiello H2S) Passive (Radiello H2S)									
P1500232		Passive (Radiello H2S)								
Explair	any discrepanc	ries: (include lab sample I	D numbers):							_

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058 ALS Project ID: P1500232

Hydrogen Sulfide

Test Code: ALS AQL 110 Date(s) Collected: 1/19/15
Instrument ID: P-UV-Vis-01 Date Received: 1/21/15
Analyst: Sue Anderson Date Extracted: 1/21/15
Sampling Media: Radiello Tube(s) Date Analyzed: 1/21/15

Test Notes: Desorption Volume: 0.010 Liter(s)

		Sampling								
Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDI.	Data
		Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	μg/m³	μg/m³	μg/m³	Qualifier
WAA-01-RH-PS-20150119	P1500232-001	20155	1.0	280	570	110	0.29	0.59	0.11	1,
WAA-02-RH-PS-20150119	P1500232-002	20165	1.0	220	570	110	0.22	0.58	0.11	J
WAA-03-RH-PS-20150119	P1500232-003	20170	1.0	160	570	110	0.16	0.58	0.11	J
WAA-04-RH-PS-20150119	P1500232-004	20169	1.0	290	570	110	0.30	0.58	0.11	J
WAA-05-RIT-PS-20150119	P1500232-005	20161	1.0	240	570	110	0.24	0.58	0.11	J
WAA-04-RH-DU-20150119	P1500232-006	20169	1.0	240	570	011	0.24	0.58	11.0	J
WAA-00-RH-TB-20150119	P1500232-007	NA	0.1	ND	570	110	NA	NA	NA	
Method Blank	P150121-MB	NA	0.1	ND	570	110	NA	NA	NΛ	

#VE 25 Februg 2015

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

NA = Not applicable.

AOI, 110 MDI M. ParcNo.

J=The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1500232Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150121-LCS,

P150121-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110 Date Sampled: NA
Instrument ID: P-UV-Vis-01 Date Received: NA
Analyst: Sue Anderson Date Analyzed: 1/21/15
Sampling Media: Radiello Tube(s) Volume(s) Analyzed: NA

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS µg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	536	538	107	108	73-129	1	5	

	with any and a second		AND SECTION SE
(ALS)	Enui	conm	ental
		er enters to the little fit	Character of the company of

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

Service Request#: 6/500071 P190232 Prep Run #: 277 759

			The second secon
	ACCUPATION AND ADDRESS OF THE ACCUPA		
	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524-69151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	524-0408140)	<i>500</i> 425 ug/L	4/8/15
AND THE RESIDENCE OF THE PROPERTY OF THE PROPE	4900)	84112115	Bouquaregicaregiae uniconering discoloritisministism und

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06251402	6/25/15	10 mL Ferric CI + 50
Amino Sulfuric	524-123/1402	1/3///5	mL Amino Sulfuric prepped prior to
radiello Tube	14315	7	coloring step

Calibration Curve: RAD 171 diluted to volume with Deionized Water 10 mL aliquot of each Prep run NA 0.05 / 50 0.10 / 50 0.20 / 50 0.50 / 50 1.0 / 50 Corr. Coeff 0.75 / 50 ug/L (ppb) 0 57.3 229 573 859 115 1145 0.865 0.230 0.577 1140 0.000 0.053 0.124 Abs. @ 665 nm Temp. Corrected Result H₂S Result Extract Volume Absorbance @ Corrected Sampling Blank Subtract Result Result ug/m³*** Abs.* ug/L (ppb) // Ang/sample Sample ID Time (mins) (L) Dilution Abs. 665 nm ppbV** Temp 2.19/260 416 0,000 10.000 IG 50019/4 0,508 0,508 /0/ 25°C MBI 0.010 0.011 0,01 500 US/L -0.60 13070 30.70 Contractor 13092 3066

*Concentration after blank subtraction (as applicable)		K YSE
Comments: **H ₂ S in ppbV = ng H ₂ S / (0.096 ng/ppb · min) x time in minutes; ***ug	$g/m^3 = ppbV H_2S x$ (34.09 MW of $H_2S / 24.46$ gas constant)	MAGION = (FIB)
LCS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium S	Sufficient VF4B	100
Prepped By:	bate: 1/21/15 @ 1400	SAMPUNG RATE
Analyzed By:	Date: 1/2//5 (0 /430	- The state of the
Reviewed By: (AV)	Date: 1/22/15	
	RL = 570 mg	- TOB
	MDC = 110 219	8/

(ALS) Environmenta	
Service Request#:	

Hydrogen Sulfide (H₂S) in Air Bench Sheet AUS AQL 110

Prep Run #: 227759

page 282 Run#: 439943

			and the second s
	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524 -09/5/401	57250 ug/L	4/2/15
Sulfide ICV/CCV	524-04081401	425 ug/L	4/8/15
	(W 64)	DX GIV GIVILE	

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06251402		10 mL Ferric CI + 50
Amino Sulfuric	524-12311402	1 1 2 1 1 1 5	mL Amino Sulfuric prepped prior to
radiello Tube	14315		coloring step

Calibration (Curve:	RAD 1	71 dili	uted to	volume	with De	eionized	Water	•
							1	1	30000-000

Campiation Carve.	10.15 11.1 411		I I I I I I I I I I I I I I I I I I I	l lonized vvale	1	T			T			1
10 mL aliquot of ea	ch Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef	f	
ug/L (ppl	0)	0	57.3	115	229	573	859	1145	0.49437648		1-8 N	16=1.
Abs. @ 665	nm	0.00	0.053	0.124	0,230	0,577	0.865	1.140	REGINEC	75)		
AND SEARCH OF SECURITY		a Businett	4-104-1-22-2-1-1-2-1		TO STATE OF THE PARTY OF THE PARTY.				या च्या प्रस्ट	Temp.	Corrected	1
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m³***	
P1500074-7.01	9	NA	0.010	A constitution of the second	0.011	0.012	0.001	-1.18 /4/1.t	2/10			
P1500232-1-01	20155	-1.700	1	- CONTRACTOR SECTION	0.011	0.043	0.032	29.863	283.059	0,21	0,29	JFZ
-2.01	20165	l l		- Palance and the Second	0.011	0.036	0.025	22.850	2/6,606	0.16	0,23	
-3.01	20170			2 story on the Contract of State of Sta	0.011	0,030	0.019	16.843	159.647	10,12	0.16	
-4.01	20169			*Anterior Contraction Contract	0.011	0.044	0.033	30.864	292.95	60,20	0,30	
-5.01	20/6/			entered transmission of the second	B.011	0.038	0.027	24,855	235,31	30.17	0.24	
1-6,01	20169	N.		: riscontrol and state of the s	0.011	0.038	0.027	24.855	239.59	30.17	0,24	
U -7.01	9	NA	V	* CAMPAGNATA CONTRACTOR	0.011	0.015	0.004	1.82/111.6	4/10	·	/	
UNZ 20191	, —	Монунция	4 Antaragent Connection	* Printerm maker*	- Accession of the Contract of	0.504	0,504	503			1016	16
CCB2		*ACCUPATION OF THE PERSON OF T	Caroline Company	D-Medicontemporary)	- This see see see see see see see see see s	0.000	0.00	-2.19/211	6			
ICV/CCV Acceptance Criteria: 90 -110%												1
LCS/DLCS Acceptance Criteria: 73 – 129%												
RPD Acceptance Criteria: <5%												
Note: the resu	lts as calculated or	the Bench S	heet may vary sligh	tly than what is rep	orted due to sig figs	used for calculation	٦.					
	,				I							

Concentration after blank subtraction (as applicable)	THE WAY
Comments: **H ₂ S in ppbV = ng H ₂ S / (0.096 ng/ppb min) x time in minutes; ***ug/m ³ = ppbV H ₂	S x (34.09 MW of H ₂ S / 24.46 gas constant) 000 00 00 00 00 00 00 00 00 00 00 00 0
CS (500 ug/L): spike tube with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide 0,7 , 8/32 Prepped By:	Date 1/2/1/5 (1/4/0) SAMOUNG PATE
	Date: 112/15 @ 1430
Reviewed By:	Date: 1/24/15
	, , ,

524-03/8/40/ 500AMNOZ Purchased RICCA Chemical Company Cat No 5444.5-4 LOTE 3403762 120 mlAmber glass LOT# 2403762 EXP: 9/2014 320/401 0:/NH280y 1 H2804 (EMD 49284; EXP.) 1 22 W/DE EXP: 4/8/15 504-0408/402 0.1 NHZSOY 5.6ml CONC HZSOY (OMD 49384; EV) 11/20/14) 9 2 W DIHZO EXP: 11/20/14 534-0422140/ 1000PM Soz Stock 0.16919 N92503 (IT later 1074410627; Ext.: 8/31/14 1100NUW(DI H2O. EXP: 5/6/14

1:1 HZSOY 250ml conc Hy Sly (emo 49284, EXP: 11/20, DOM DI HZO 11/29/14 420 (Mallinebrud 5.000 Sulfavilamide (57 Baker lot 532618; EXP 1/6/16)
DISSOLVED IN SOND CONC HC/ COMP LOT # 49360;

CXP: 2/7/16) 1500M W/DIHZO

CXP: 1/20-1,00 AMINE H2SOY (GND 49284) 6.25 ml line 1.6875g N,N-AMETRY-1,4-phenylere exalet (AUDRICH MCPG 894/V 1:/1/2504

S24-09081401 0.1N HZSC 0908/402 1.0N NGOH 40H (EMD BUG 30569 12/B) 1 700M Calibration solution for Hydrogen Sulphide (code RAD171) CAUTION: Do not swallow. Wash the hands thoroughly after use. Avoid contact with the eyes, skin and clothes. In case of contact with eyes, flush with large amounts of running water for at least 15 minutes. See MSDS for complete safety information. Description

Code RAD171 relieves you from the task of preparing the sodium sulfide standard solution for the calibration curve used for the determination or H₂S by the cartridge code RAD170.

Since sodium sulfide is deliquescent, its weight is not a primary standard and sodium sulfide solution need titration once prepared. Moreover titration must be repeated often due to the installity of diluted solution (one hour time is sufficient to decrease sulfide content by 10%). Code RAD171 is a methylene blue concentrated solution that, once diluted 1:50, provides the same absorbance value at 665 nm of a sodium sulfide solution of with concentration 1.145 µg·ml-1 sulfide ions.

This concentration value has been chosen to obtain the highest absorbance value within the linearity range of the spectrophotometer. To obtain a complete calibration curve, just dilute the mother solution as shown in the table. Code RAD171 allows you to prepare as many as 50 calibration curves. torage
Store in original containers or other appropriately labeled, suitable containers.
Kept in a cool, dry environment away from sources of heat code RAD171 solution is stable for at least one year

1 524-12371401 11/ HZSOG 250ml DI + 250ml Cine HZSOG (PMO 54174; ENP 11/7/19). LET COOL EXP: 12/31/15 14 Stowey ADD 6.25 R CONC. HZSLY COMP 254174; EXP. 11/7/19) TO 25M DT. LET CA DISCOVE [.68759 N.N-Dinistry]-1,4-phenylene diamina oxalate (Aldubeh MKBG8341V; exp. 5/24/16, IN ABOVE AUD SOLV. Then DILUTE TO SSOME W/ 1:/HZSOY (824-123/1401; exp. 24/3-1/31/19

EXP: +2/3-1/31/19

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	P15000342
Sample Numbers:	WAA-01-RH-PS-20150128, WAA-02-RH-PS-20150128, WAA-03-RH-PS-20150128, WAA-04-RH-PS-20150128, WAA-04-RH-DU-20150128, WAA-05-RH-PS-20150128, and WAA-00-RH-TB-20150128
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pathat were found, and data qualification.	ratory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
I, Harry Ellis, certify that all data va	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	25 February 2015
Certified by Harry Ellis, Chemist	Date

103I9025140058.000 1 SDG P1500342

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

DATA ASSESSMENT

Sample delivery group (SDG) P1500342 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

All detected results in the field samples were less than the sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these results as estimated and flagged them "J". All detected results, including the field duplicate pair, were quite similar.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

February 17, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on January 29, 2015. For your reference, these analyses have been assigned our service request number P1500342.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

By Sue Anderson at 9:58 am, Feb 17, 2015

Sue Anderson Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1500342

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on January 29, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



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F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	838341
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	CA200007
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1500342

Project ID: West Lake Landfill / 103X9025140058

Date Received: 1/29/2015 Time Received: 09:40 L 110 - H2S Air

					
			Date	Time	$ \mathbf{v} $
Client Sample ID	Lab Code	Matrix	Collected	Collected	CA
WAA-01-RH-PS-20150128	P1500342-001	Air	1/28/2015	14:02	X
WAA-02-RH-PS-20150128	P1500342-002	Air	1/28/2015	13:21	X
WAA-03-RH-PS-20150128	P1500342-003	Air	1/28/2015	13:39	X
WAA-04-RH-PS-20150128	P1500342-004	Air	1/28/2015	13:53	X
WAA-05-RH-PS-20150128	P1500342-005	Air	1/28/2015	13:29	X
WAA-04-RH-DU-20150128	P1500342-006	Air	1/28/2015	13:53	X
WAA-00-RH-TB-20150128	P1500342-007	Air	1/28/2015	14:09	X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

Tetra Tech West Lake Landfill Anal	liysis: ₃ , VOCs, Aldehyde,
Company Name & Address (Reporting Information) Project Name West Lake Landfill Anal (e.g. NO ₂ , SO ₂ , O ₃ , 103X9025140058 Project Manager Project Manager	liysis: ₃ , VOCs, Aldehyde, nonia)
Tetra Tech 415 Oak Street, Kansas City, MO 64106 Project Number 103X9025140058 Project Manager Project Manager Project Manager Project Manager Project Manager Project Manager Project Manager	liysis: ₃ , VOCs, Aldehyde, nonia)
415 Oak Street, Kansas City, MO 64106 Project Number 103X9025140058 Project Manager Project Manager Project Manager Project Manager Project Number 103X9025140058 Amm	nonia)
Kansas City, MO 64106 Project Number 103X9025140068 Project Manager Project Manager Project Manager Project Manager	monia)
Project Manager P.O. # / Credit Card / Billing Information Amm	
	Comments
Rob Monnig (816-412-1775) / Dave Kinroth (314-517-6798) PO 1111500	Comments
Phone Fax Attn: Emily Fisher 816-412-1775 816-410-1748 415 Oak Street, Kansas City, MO 64106 Email Address for Result Reporting emily.fisher@tetratech.com	and the second s
816-412-1775 816-410-1748 415 Oak Street, Kansas City, MO 64106 C C C C C C C C C C C C C C C C C C C	and the second s
Email Address for Result Reporting emily.fisher@tetratech.com emily.fisher@tetratech.com	and the second s
emily.fisher@tetratech.com	and the same of th
	and the same of th
Client Sample ID Laboratory ID Number Start End Total Sampling Time (minutes) Sampling Temp 25°C assumed if not specified Sticker Number Start End Time (minutes)	
WAA-01-RH-PS-20150128	
WAA-02-RH-PS-20150128 Z 1/19/15 @ 1/28/15 @ 12967 3.3 786HT X	
WAA-03-RH-PS-20150128 3 1/19/15 @ 1/28/15 @ 12959 3.3 787HT X	
WAA-04-RH-PS-20150128	
WAA-05-RH-PS-20150128 5 1/19/15 @ 1/28/15 @ 12969 3.3 789HT X	
WAA-04-RH-DU-20150128	
WAA-00-RH-TB-20150128 7 1/19/15 @ 1/28/15 @ NA NA 791HT X	
	2.
Report Tier Levels - please select one Tier I - (Results/Default if not specified) Tier III (Data Validation Package) 10% Surcharge EDD required Yes Chain of Tier III (Results + QC) Tier V (client specified) Type: INTACT	of Oustody Seal (Circle) The Broken (ABSENT)
Reliquished by: (Signature) Date: Time: Received by: (Signature) Date: Date: Time: Date:	Time:
Reliquished by: (Signature)	11/5 0990
Reliquished by: (Signature) Date: Time: Received by: (Signature) Date:	Time: Cooler / Blank Temperature°C

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, In	*			-	Work order:	P1500342				
-		indfill / 103X90251400)58								
_	s) received on:				Date opened:		_ by:	KKEL			
		ll samples received by ALS.			-	=			dication	of	
ompliance	or nonconformity.	. Thermal preservation and p	oH will only be e	valuated either at	the request of th	e client and/or as requ	aired by the methor	od/SOP. <u>Yes</u>	<u>No</u>	N/A	
1	Were sample	containers properly m	arked with cli	ent sample ID	19			X			
2	_	supplied by ALS?	arked with en	ent sample 1B	•			×			
3	Did sample co	\boxtimes									
4	Were chain-of-custody papers used and filled out?										
5	<u> </u>										
6	Was sample v	v olume received adequ	ate for analysi	is?				X			
7	_	vithin specified holding	-					X			
8	_	emperature (thermal p		f cooler at rec	eipt adhered t	xo?		\times			
		nperature: 1° C Blar				Wet	Ice				
9		tube received?		-				X			
10		seals on outside of co	oler/Box?						$\overline{\mathbf{x}}$		
10	were casesay	Location of seal(s)?					Sealing Lid?			×	
	Were signatur	re and date included?					_ Seaming End.			X	
	Were seals int									X	
		seals on outside of sar	nnle container	.9					×		
	Were custody	Location of seal(s)?					Sealing Lid?			X	
	Were signatur	re and date included?					_ Beaming Ela.			X	
	Were seals int									×	
11		ers have appropriate pr	ecervation a	cording to me	ethod/SOP or	Client specified	information?			\boxtimes	
11		ent indication that the s		•		Chefit specified	iiioiiiatioii:			X	
		vials checked for presen	_		eserved.					X	
					1TT1	· C				\boxtimes	
10		nt/method/SOP require	-		impie pri and	ii necessary antei	11.7				
12	Tubes:	Are the tubes capp		,				X			
		Do they contain m							X		
13	Badges:	Are the badges pro	operly capped	and intact?						X	
		Are dual bed badg	es separated a	ınd individuall	y capped and	intact?				X	
Lab	Sample ID	Container	Required	Received	Adjusted	VOA Headspace	Recei	pt / Pres	ervation	1	
	•	Description	pH *	pН	pН	(Presence/Absence)		Commer			
P1500342	2-001.01	Passive (Radiello H2S)									
P1500342		Passive (Radiello H2S)									
P1500342	2-003.01	Passive (Radiello H2S)									
P1500342		Passive (Radiello H2S)									
P1500342		Passive (Radiello H2S)									
P1500342		Passive (Radiello H2S)			ļ						
P1500342	2-007.01	Passive (Radiello H2S)									
					<u> </u>	<u> </u>	1				
Explair	n any discrepanc	ies: (include lab sample I	D numbers):								

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1500342

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID:

P-UV-Vis-01

Analyst:

Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

Date(s) Collected: 1/28/15 Date Received: 1/29/15

Date Extracted: 2/11/15

Date Analyzed: 2/11/15 Desorption Volume:

0.010 Liter(s)

Sampling

		Samping								
Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
		Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	Qualifier
WAA-01-RH-PS-20150128	P1500342-001	12961	1.0	300	570	110	0.45	0.85	0.16	J
WAA-02-RH-PS-20150128	P1500342-002	12967	1.0	260	570	110	0.39	0.85	0.16	J
WAA-03-RH-PS-20150128	P1500342-003	12959	1.0	260	570	110	0.38	0.85	0.16	J
WAA-04-RH-PS-20150128	P1500342-004	12961	1.0	400	570	110	0.59	0.85	0.16	J
WAA-05-RH-PS-20150128	P1500342-005	12969	1.0	170	570	110	0.25	0.85	0.16	J
WAA-04-RH-DU-20150128	P1500342-006	12961	1.0	270	570	110	0.41	0.85	0.16	J
WAA-00-R11-TB-20150128	P1500342-007	NA	1.0	ND	570	110	NΛ	NA	NΛ	
Method Blank	P150211-MB	NA	1.0	ND	570	110	NA	NA	NΛ	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

NA = Not applicable.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL. HUE 25 Februs 2015

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated
Client Sample ID: Duplicate Lab Control Sample

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1500342Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150211-LCS,

P150211-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: ALS AQL 110 Date Sampled: NA
Instrument ID: P-UV-Vis-01 Date Received: NA
Analyst: Sue Anderson Date Analyzed: 2/11/15
Sampling Media: Radiello Tube(s) Volume(s) Analyzed: NA

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS µg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	549	545	110	109	73-129	1	5	

A	
(ALS) Enuir	onmental

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

Service Request#: P1500347 P15048/

Prep Run #: 229/15

Run#: 432468

9	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524-09151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	524-04081401	500 425 ag/L	4/8/15

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06051402	6/25/15	10 mL Ferric C1 + 50
	524-07/0/502		ml, Amino Sulfuric prepped prior to
radiello Tube	14315	01/15	coloring step

mL aliquot of ea	ach Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coeff	
ug/L (pp	b)	0	57.3	115	229	573	859	1145	A GOGG	96744 2	LE.
Abs. @ 66	5 nm	0.000	0.054	0.122	0.234	0.574	0.866	1.144	DE CLAPEC	79744 Z Temp C	
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result	Result H ₂ S	Result
CB 1	-					0.000	0.000	-2.05/2W A	11.6		• 1
CV 5009/C						0.534	0.534	532			1064
131		25°C	0.010			0.013	0.013	109 /L11.6	1110.		
182			1			0.013	0.013	10.9/611.6		Ω	<i>\</i> D
CS 500 9/L					0.013	20470.	594 0.58/	578 69 548	\$ 5490	11/0	5/10%
US I		>			1	00430.	990 0.577	574.69 544	3 5447	PIT	7 10992
150342-1.01	12961	3.30			1/10	0.0486.	0470.034	31.931	302.667	0.32	945
	12967]			4	0.0570.	043 0,030	27,933	264.769	0,28	0,40
-3.01	12959				28	203301	42 0.029	26,934	255.295	0,27	938
4.01	12961	a a				0.057	0.044	41.927	397,410	0.43	0.59
1-5.01	12969					0.033	0.020	17.938	170.004	0,18	0.05
1 -6.01	12961	7	0		J	0.044	0.031	28.433	274.244	0.29	0.41
W/ 5005/			,	<u>د</u>		0.532	0.532	530			1069
ClBI	_		_			0.00	0000	-2.05/11/6			7

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Analyzed By:

Reviewed By:

Date: 2/18/15

Date:

	A				
4					
	G a				
(A	(LS)	Enuire Request	onme	ental	
3	Sanina	Doguech	. <i>JU /</i>	6700 Z	1

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

P1500481

Prep Run #: 209118

Run #:

	Ref#	Concentration (untl.)	Eur Data
RAD 171 Stock	524-09/540/	Concentration (ug/L) 57250 ug/L	Exp. Date
Sulfide ICV/CCV	524 -0408140)	500 425 ug/L	4/8/15
	(ALDIN)	9-11-	1 1 400

Coloring Solution Reference or Lot # Reagents Exp. Date Ferric Chloride 10 mL Ferric C1 + 5 nt, Amino Sulfuric Amino Sulfurio prepped prior to coloring step radiello Tube

Calibration Curve: RAD 171 diluted to volume with Deignized Water

libration Curve:	KAD 1/1 dill	nea to vo	Diume with Dei	ionized vvate	F		<u> </u>	ı — —	I			T
10 mL aliquot of eac	h Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef		
ug/L (ppb)	. 0	57.3	115	229	573	859	1145	1666	95744	12 1	000
Abs. @ 665	nm	0.000	0.054	0.122	0.234	0.574	0.866	1.144	0.777	ר די זנה ו	·	
	t/i			1994 Tyles	and the state of			E-Land Color		Temp	Corrected	7
İ	Sampling		Extract Volume		Blank Subtract	Absorbance @	Corrected	Result	Result	Result H ₂ S	Result	
Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.	665 nm	Abs.*	ug/L (pp/b)	ng/sample	ppbV**	ug/m³***	1
0150342-7.01	0	NA	0,010		0,013	0:014	0.001	-1.05/411.6	4110		W	
150048-1.01	100 85	2,200				0.032	0.019	16.1938	160.550	922	0.31	\mathbb{T}^{r}
-201	10088	7				0.028	0,015	12940	122650		0,24	丁
-3.0/	10091					0.026	0.013	10,9 /211.6	2110	10.16	10.22	7 ~
-4.01	10084	\neg				0.030	0.017	14.939	141,601	0,20	0,08	
-5.01	100 88	\neg				0.029	0.016	13,939	132.127		0,26	
-6.01	100 84	V				0.030	0.017	14.9341	141,601	0,20	0,28	7
11 -7.01	0	NA	T		V	0.013	0.000	2.05/416				
-CN7-50013/4						0.532	0.532	530		5:	106	%
CUBA						0.000	0.000	-2.05/41.t	}			7
								1				7
ICV/CCV Acceptant									1/2			7
LCS/DLCS Acceptar		129%								-		1
RPD Acceptance Co	APPOINT TO SUBJECT OF THE STATE			up one com President and a service of		16 1 1 1				4		-{
Note: the results a	is calculated on th	ie Bench She	et may vary slightly t	than what is report	tea aue to sig tigs us	eq for calculation.		1				1

*Concentration after blank subtraction (as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

LCS (500 ug/L): spike Tuke with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide gra

LCS (500 ug/L): spike tupe with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide

Prepped By: Analyzed By:

Reviewed By:

132
11 524-03/8/40/ 500AMNOZ
3/18/14 Perchased
Ricca Chemical Company Cut No 5444.5-4
LOT# 2403762 120 ml Amber glas
EXP: 9/2014
3/20/14 524-0320/40/ 0/NHZON
6 5,6 M Com H2801 (EMD 49284; ESP;
11/20/14) 1 22 W/DI
EXP: 11/20/14
116/14 524-1408/401 Madulan Rhia 20 201
Man Durchaselle Story
Alfa Lesas LOT 1/207010
STALL 40 771
EXP: 4/8/15
110/11 22U-04(18/1402 01 N/H280V
5 tom Cour H2 SOY 10MD 49284; EV?
11/20/14) 9 DC W/ DIHZO
Exp: 1/20/14
Land Carrella 211101 immonal Car Stock
4/22/14 534-0422/40/ 1000PM Soz Stocle 0.15919 Na2Soz (IT laber WTHH10627; Ext: 8/31)
1 wond whit (420.
EXP. 5/6/14

Tetra Tech, Inc. DATA VALIDATION REPORT LEVEL II

Site:	West Lake Landfill Site, Bridgeton, Missouri
Laboratory:	ALS Environmental (Simi Valley, California)
Data Reviewer:	Harry Ellis, Tetra Tech, Inc. (Tetra Tech)
Review Date	February 25, 2015
Sample Delivery Group (SDG):	P15000481
Sample Numbers:	WAA-01-RH-PS-20150204, WAA-02-RH-PS-20150204, WAA-03-RH-PS-20150204, WAA-04-RH-PS-20150204, WAA-04-RH-DU-20150204, WAA-05-RH-PS-20150204, and WAA-00-RH-TB-20150204
Matrix / Number of Samples:	5 Air Samples, 1 Field Duplicate Sample, and 1 Trip Blank
Methods Data Review" (9240.1-48) Packages from Subcontracted Labor in the applicable methods. The review was intended to identify apparent from the summary data pathat were found, and data qualifications.	ratory Program National Functional Guidelines for Superfund Organic, June 2008. In addition, the Tetra Tech document "Review of Data ratories" (February 2002) was used along with other criteria specified problems and quality control (QC) deficiencies that were readily ckage. The following sections discuss any problems or deficiencies ions applied because of non-compliant QC. The data review was poratory QC information submitted with the project-specific data
I, Harry Ellis, certify that all data va	alidation criteria outlined in the above-referenced documents were de to the data accorded with those documents.
Hang N. Elli	25 February 2015
Certified by Harry Ellis, Chemist	Date

103I9025140058.000 1 SDG P1500481

DATA VALIDATION QUALIFIERS

- U The analyte was not detected above the reported sample quantitation limit.
- **J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- **UJ** The analyte was not detected above the reported sample quantitation limit, which is estimated.
- **R** The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

103I9025140058.000 2 SDG P1500481

DATA ASSESSMENT

Sample delivery group (SDG) P1500481 included five (5) environmental air (RadielloTM adsorbent tube) samples and two (2) QC samples (a field duplicate and a trip blank). Samples were analyzed for hydrogen sulfide via the laboratory's implementation of the manufacturer's method. The following summarizes the data validation that was performed.

VOLATILE ORGANIC COMPOUND ANALYSIS

I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the accepted holding time of 30 days from sample collection by tube to analysis. No data were qualified.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analyses are not practical for air analyses. Satisfactory LCS and field duplicate sample analysis provided adequate data on precision and accuracy. No qualifications were applied.

III. Blanks

No analytes were detected in the laboratory (method) and field blanks. No qualifications were applied.

IV. Laboratory Control Sample (LCS)

All results for the duplicate LCS were within QC limits.

V. Surrogates

Surrogates are not used in this analysis.

VI. Comments

All detected results in the field samples were less than the sample reporting limits, which correspond to the lowest calibration standard. The laboratory correctly qualified these results as estimated and flagged them "J". All detected results, including the field duplicate pair, were quite similar.

VII. Overall Assessment of Data

Overall data quality is acceptable, with no qualifications added. All data are usable as reported for their intended purposes.

103I9025140058.000 3 SDG P1500481

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2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

LABORATORY REPORT

February 17, 2015

Rob Monnig Tetra Tech, Incorporated 415 Oak Street Kansas City, MO 64106

RE: West Lake Landfill / 103X9025140058

Dear Rob:

Enclosed are the results of the samples submitted to our laboratory on February 6, 2015. For your reference, these analyses have been assigned our service request number P1500481.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

By Sue Anderson at 10:00 am. Feb 17, 20

Sue Anderson Project Manager



2655 Park Center Dr., Suite A Simi Valley, CA 93065 T: +1 805 526 7161 F: +1 805 526 7270 www.alsglobal.com

Service Request No:

P1500481

Client: Tetra Tech, Incorporated

Project: West Lake Landfill / 103X9025140058

CASE NARRATIVE

The samples were received intact under chain of custody on February 6, 2015 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H,S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer. This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.



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F: +1 805 526 7270 www.alsglobal.com

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L14-2
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	838341
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	CA200007
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413- 14-5
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA01627201 4-4
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Tetra Tech, Incorporated Service Request: P1500481

Project ID: West Lake Landfill / 103X9025140058

Date Received: 2/6/2015 Time Received: 09:40 QL 110 - H2S Air

					$ \mathcal{O}_{A} $
			Date	Time	N N
Client Sample ID	Lab Code	Matrix	Collected	Collected	CA
WAA-01-RH-PS-20150204	P1500481-001	Air	2/4/2015	14:07	X
WAA-02-RH-PS-20150204	P1500481-002	Air	2/4/2015	13:29	X
WAA-03-RH-PS-20150204	P1500481-003	Air	2/4/2015	13:50	X
WAA-04-RH-PS-20150204	P1500481-004	Air	2/4/2015	13:57	X
WAA-05-RH-PS-20150204	P1500481-005	Air	2/4/2015	13:37	X
WAA-04-RH-DU-20150204	P1500481-006	Air	2/4/2015	13:57	X
WAA-00-RH-TB-20150204	P1500481-007	Air	2/4/2015	14:14	X



2655 Park Center Drive, Suite A Simi Valley, California 93065 Phone (805) 526-7161

(ALS)	Fax (805) 52	6-7270		I '			arges) please circle ALS Project No. P 1500481						
				1 Day (100%) 2 Da	ay (75%) 3 Day (50°	%) 4 Day (35%) 5	5 Day (25%) 10 Day-Standard						
O				Dusings Name		•	f						
Company Name & Address (Reporting Information)				Project Name			Sue Anderson						
Tetra Tech 415 Oak Street,				West Lake Landfil	l.			Analysis:					
Kansas City, MO 64106				Project Number			(e.g. NO₂, S	O_2 , O_3 , VOC	s, Aldehyde,				
				103X9025140058		•		Ammonia)					
Project Manager			P.O. # / Credit Care	d / Billing Information	1								
Rob Monnig (816-412-1775) / Dave Kinroth (314-517-6798)				PO 1111500		Hydrogen Sulfide			Comments				
Phone Fax				Attn: Emily Fishe] =	İ					
816-412-1775	816-410-174	8		415 Oak Street, K	ansas City, MO 641	06	80						
Email Address for Result Reporting							Ö						
emily.fisher@tetratech.com				emily.fisher@tetra	atech.com	<u></u> <u>e</u>	1		}				
Client Sample ID	Laboratory ID Number	Date/Time Start	Date/Time End	Total Sampling Temp Time (minutes) Sampling Temp 25°C assumed if not specified		Radiello ID Sticker Number	H _y		:				
WAA-01-RH-PS-20150204	0	1/28/15 @ 14:02	2/4/15 @ 14:07	10085	2.2	778HT	X.						
© A/AA-02-RH-PS-20150204	0	1/28/15 @ 13:21	2/4/15 @ 13:29	10088	2.2	779HT	х						
WAA-03-RH-PS-20150204	9	1/28/15 @ 13:39	2/4/15 @ 13:50	10091	2.2	780HT	x						
WAA-04-RH-PS-20150204	3	13:53	2/4/15 @ 13:57	10084	2.2	781HT	X	•					
WAA-05-RH-PS-20150204	0	1/28/15 @ 13:29	2/4/15 @ 13:37	10088	2.2	782HT	х						
WAA-04-RH-DU-20150204	(G)	1/28/15 @ 13:53	2/4/15 @ 13:57	10084	2,2	783HT	×						
WAA-00-RH-TB-20150204	7	1/28/15 @ 13:15	2/4/15 @ 14:14	NA	NA	784HT	х						
		<u></u>				<u> </u>							
Report Tier Levels - please select one Tier I - (Results/Default if not specified) Tier II (Data Validation Tier II (Results + QC) Tier V (client specified)				ackage) 10% Surch		EDD required Ye		Chain of Custoo	ty Seal: (Circle) KEN ABSENT	Project Requirements (MRLs,	QAPP)		
Reliquished by: (Signature)			Date:	Time:		y: (Signature)		Date:	Time:				
	1517 Cy		Date:	Time:	Received b	y (Signature)		Date: /4/15	Time: 6940				
Reliquished by: (Signature)	Date:	Time:	Received b		Date:	Time:	Cooler / Blank Temperature°C						

ALS Environmental Sample Acceptance Check Form

	Tetra Tech, Ir					Work order:	P1500481				
		ndfill / 103X90251400)58			0/5/004 #					
_	s) received on:				Date opened:		_ by:	ADAV			
		1 samples received by ALS.		-	-	=			dication	of	
ompliance	or nonconformity.	Thermal preservation and p	oH will only be e	valuated either at	the request of the	e client and/or as req	uired by the meth	od/SOP. <u>Yes</u>	<u>No</u>	<u>N/A</u>	
1	Were sample	containers properly m	arked with cli	ent sample ID	?			X			
2	Container(s) s	ntainer(s) supplied by ALS?									
3	Did sample co	X									
4											
5	Did sample co	ontainer labels and/or	tags agree wi	th custody pap	ers?			X			
6	Was sample v	v olume received adequ	ate for analys	is?				X			
7	Are samples v	vithin specified holding	g times?					X			
8	=	emperature (thermal p		f cooler at rec	eipt adhered t	to?				X	
9	Was a blank	tube received?						X			
10	Were custody	seals on outside of co	oler/Box?					X			
		Location of seal(s)?					_Sealing Lid?	X			
	Were signatur	e and date included?						X			
Were seals intact?											
	Were custody	seals on outside of sar	nple container	?					X		
		Location of seal(s)?					Sealing Lid?			X	
	Were signatur	re and date included?					_			X	
	Were seals int	tact?								X	
11	Do containe	ers have appropriate pr	eservation, a	ccording to me	ethod/SOP or	Client specified	information?			X	
		ent indication that the si		•		•				X	
	Were VOA v	rials checked for preser	nce/absence of	f air bubbles?						X	
		nt/method/SOP require			mple pH and	if necessary alte	r it?			X	
12	Tubes:	Are the tubes capp			pro pri uno	ii iio o o s s air j		$\overline{\mathbf{x}}$			
12	1 does.								\boxtimes		
12	Dodgoga	Do they contain m		and intact?						\boxtimes	
13	Badges:	Are the badges pro				:449				X	
		Are dual bed badg	es separated a	ina marviauan	y capped and	I mtact?					
Lab	Sample ID	Container	Required	Received	Adjusted	VOA Headspace		pt / Pres		1	
		Description	pH *	pН	pН	(Presence/Absence)	Commer	ıts		
P150048		Passive (Radiello H2S)									
P150048		Passive (Radiello H2S)									
P150048		Passive (Radiello H2S)									
P150048		Passive (Radiello H2S)									
P150048		Passive (Radiello H2S)									
P150048		Passive (Radiello H2S)									
P150048	1-007.01	Passive (Radiello H2S)									
Г 1:	1"		D 1)		<u>I</u>	1					
Explan	a any discrepanc	ies: (include lab sample I	וע numbers):								

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client:

Tetra Tech, Incorporated

Client Project ID: West Lake Landfill / 103X9025140058

ALS Project ID: P1500481

Hydrogen Sulfide

Test Code:

ALS AQL 110

Instrument ID: Analyst:

P-UV-Vis-01 Sue Anderson

Sampling Media: Radiello Tube(s)

Test Notes:

Date(s) Collected: 2/4/15

Date Received: 2/6/15

Date Extracted: 2/11/15

Date Analyzed: 2/11/15

Desorption Volume:

0.010 Liter(s)

		Sampling
4 Committee ID	ALC Committe ID	Time

		Samping								
Client Sample ID	ALS Sample ID	Time	Dilution	Result	MRL	MDL	Result	MRL	MDL	Data
		Minutes	Factor	ng/Sample	ng/Sample	ng/Sample	μg/m³	μg/m³	μg/m³	Qualifier
WAA-01-RH-PS-20150204	P1500481-001	10085	1.0	160	570	110	0.31	1.1	0.21	J
WAA-02-RH-PS-20150204	P1500481-002	10088	1.0	120	570	110	0.24	1.1	0.21	J
WAA-03-RH-PS-20150204	P1500481-003	10091	1.0	ND	570	110	ND	1.1	0.21	
WAA-04-RH-PS-20150204	P1500481-004	10084	1.0	140	570	110	0.28	1.1	0.21	J
WAA-05-RH-PS-20150204	P1500481-005	10088	1.0	130	570	110	0.26	1.1	0.21	J
WAA-04-RH-DU-20150204	P1500481-006	10084	1.0	140	570	110	0.28	1.1	0.21	J
WAA-00-RH-TB-20150204	P1500481-007	NA	1.0	ND	570	110	NA	NA	NA	
Method Blank	P150211-MB	NA	1.0	ND	570	110	NA	NA	ΝΛ	

HVE 25 Febry 2015

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

NA = Not applicable.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS Page 1 of 1

Client: Tetra Tech, Incorporated
Client Sample ID: Duplicate Lab Control Samp

Client Sample ID:Duplicate Lab Control SampleALS Project ID: P1500481Client Project ID:West Lake Landfill / 103X9025140058ALS Sample ID: P150211-LCS,

P150211-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code:ALS AQL 110Date Sampled: NAInstrument ID:P-UV-Vis-01Date Received: NAAnalyst:Sue AndersonDate Analyzed: 2/11/15Sampling Media:Radiello Tube(s)Volume(s) Analyzed: NA

Test Notes:

	Spike Amount	Re	esult	% Re	covery	ALS	Relative		
Compound	LCS / DLCS µg/L	LCS µg/L	DLCS μg/L	LCS	DLCS	Acceptance Limits	Percent Difference	RPD Limit	Data Qualifier
Hydrogen Sulfide	500	549	545	110	109	73-129	1	5	

A	
(ALS) Enuir	onmental

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

Service Request#: P1500347 P15048/

Prep Run #: 229/15

Run#: 432468

9	Ref#	Concentration (ug/L)	Exp. Date
RAD 171 Stock	524-09151401	57250 ug/L	9/2/15
Sulfide ICV/CCV	524-04081401	500 425 ag/L	4/8/15

Reagents	Reference or Lot#	Exp. Date	Coloring Solution
Ferric Chloride	524-06051402	6/25/15	10 mL Ferric C1 + 50
Amino Sulfurio	524-07/0/502		ml. Amino Sulfuric prepped prior to
radiello Tube	14315	01/15	coloring step

mL aliquot of ea	ch Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coeff	
ug/L (pp	b)	0	57.3	115	229	573	859	1145	A GOGG	96744 2	, GE
Abs. @ 66	5 nm	0.000	0.054	0.122	0.234	0.574	0.866	1.144	DE CLAPEC	79744 Z Temp C	>
Sample ID	Sampling Time (mins)	Temp	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result	Result	Result H ₂ S	Result
CB 1						0.000	0.000		11.6		·
W 5009/C						0.534	0.534	532			1064
131		25°C	0.010			0.013	0.013	109 /L11.6	1110.		
182						0.013	0.013	10.9/211.6		Ω	<i>\</i> D
CS 500 9/L					0.013	20470.	594 0.581	578,69 548	\$ 5490	11/0	5/10%
US I		>			1	00430.	990 0.577	574.69 544	3 5447	PIT	7 10992
150342-1.01	12961	3,300			1/10	0.0486.	0470.034	31.931	302.667	0,32	945
	12967			·	4	0.0570.	043 0,030	27,933	264.769	0,28	0,40
-3.01	12959				28	265301	42 0.029	26,934	255.295	0,27	938
4.01	12961	a a				0.057	0.044	41.927	397,410	0.43	0.59_
1-5.01	12969					0.033	0,020	17.938	170.004	0,18	0.25
1 -6,01	12961	V	V		J	0.044	0.031	28.433	274.244	0.29	0.41
W/ 5005/						0.532	0.532	530			1069
ClbI	_	_	_			000	0.000	-2.05/11/6			7.4

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Analyzed By:

Reviewed By:

Date: 2/18/15

Date:

	A				
4					
	G a				
(A	(LS)	Enuire Request	onme	ental	
3	Sanina	Doguech	. <i>JU /</i>	6700 Z	1

Hydrogen Sulfide (H2S) in Air Bench Sheet

ALS AQL 110

P1500481

Prep Run #: 209118

Run #:

	Ref#	Concentration (untl.)	Sun Data
RAD 171 Stock	524-09/540/	Concentration (ug/L) 57250 ug/L	Exp. Date
Sulfide ICV/CCV	524 -0408140)	500 425 ug/L	4/8/15
	(DEDTO)	9-7/1/	

Coloring Solution Reference or Lot # Reagents Exp. Date Ferric Chloride 10 mL Ferric C1 + 5 nt, Amino Sulfuric Amino Sulfurio prepped prior to coloring step radiello Tube

Calibration Curve: RAD 171 diluted to volume with Deignized Water

ibration Curve:	KAD 1/1 dill	nea to vo	Diume with Dei	ionized vvate	F		<u> </u>	ı — —	I			T
10 mL aliquot of eac	h Prep run	NA	0.05 / 50	0.10 / 50	0.20 / 50	0.50 / 50	0.75 / 50	1.0 / 50		Corr. Coef		
ug/L (ppb)	. 0	57.3	115	229	573	859	1145	0.999957443		12 1	000
Abs. @ 665 nm		0.000	0.054	0.122	0.234	34 0.574	0.574 0.866	66 1.144			866 1.144	
	t/i			1994 Tyles	and the state of			E-Land Color		Temp	Corrected	7
İ	Sampling		Extract Volume		Blank Subtract	Absorbance @	Corrected	Result	Result	Result H ₂ S	Result	
Sample ID	Time (mins)	Temp	(L)	Dilution	Abs.	665 nm	Abs.*	ug/L (pp/b)	ng/sample	ppbV**	ug/m³***	1
0150342-7.01	0	NA	0,010		0,013	0:014	0,001	-1.05/411.6	1110		V	
150048-1.01	100 85	2,200				0.032	0.019	16.1938	160.550	922	0.31	\mathbb{T}^{r}
-201	10088	7				0.028	0,015	12940	122650		0,24	丁
-3.0/	10091					0.026	0.013	10,9 /211.6	2110	10.16	20.22	7 ~
-4.01	10084	\neg				0.030	0.017	14.939	141,601	0,20	0,08	
-5.01	100 88	\neg				0.029	0.016	13,939	132.127		0,26	
-6.01	100 84	V				0.030	0.017	14.9341	141,601	0,20	0,28	7
11 -7.01	0	NA	T		V	0.013	0.000	2.05/416				
W7-50013/4						0.532	0.532	530		5	106	%
CUBA						0.000	0.000	-2.05/41.t	}			7
								1				7
ICV/CCV Acceptant									1/2			7
LCS/DLCS Acceptar		129%								-		1
RPD Acceptance Co	APPOINT TO SUBJECT OF THE STATE					16 1 1 1						-{
Note: the results a	is calculated on th	ie Bench She	et may vary slightly t	than what is report	tea aue to sig tigs us	eq for calculation.		1				1

*Concentration after blank subtraction (as applicable)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

LCS (500 ug/L): spike Tuke with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide gra

LCS (500 ug/L): spike tupe with 0.5 ml of freshly prepped 10 ppm sulfide solution [0.0764g Sodium Sulfide

Prepped By: Analyzed By:

Reviewed By:

132
11 52403181401 500AMNOZ
3/18/14 Perchasel 1
Ricca Chemical Company Cut No 5444.5-4
LOT# 2403762 120 ml Amler glass
EXP: 9/2014
3/20/14 524-0320/40/ 01NHZOV
6 5.6 M CM H2801 (EMD 49284; EAP:
11/20/14) 1 22 W/DI
EXP: 11/20/14
ILLO W SOU - DYDE/LYD / Maybuloun Rhip 20/ Xol
IN A PUNTALLE SOUND
Alfa ACSUS LOT 1/208010
570CH 40 77/
EXP; 4/8/15
110/11 EQU-0408/1102 01 NIH280V
5ton Cour H2 SOY 10MD 49284; EV!
11/20/14) 9 DC W/ DIHZO
EXP: 11/20/14
1 - 1 - 1 - 1 - 21 - 21 - 21 - 21 - 21
4/22/14 524-0422/40/ 1000PM SOZ STOCKE 0.15919 NO2503 (JT laber WT#410627; Ext. 8/31)
1.00 nl w/DI (+20.
EXP. 5/6/14